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November 10, 1993
E613/RMP-FY94-310

George C. Marshall Space Flight Center
National Aeronautics and Space Administration
Marshall Space Flight Center, AL 35812

Attention Mr. V. K. Henson, SA51


Gentlemen:

Subject: Transmittal of Final Postflight Hardware Evaluation
Report RSRM-28 (STS-53), TWR-64216 with Appendix A-E,
DR 4-23, Type 2 Documentation

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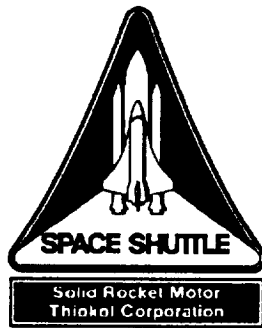
If you have any questions or comments concerning this transmittal, please direct them to the undersigned.

Very truly yours,



Robert M. Papasian
RSRM Data Manager

Encl: a/s



TWR-64216

Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

November 1993

Prepared for:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
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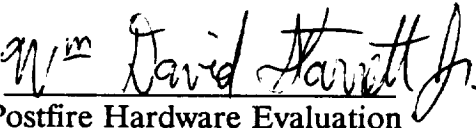
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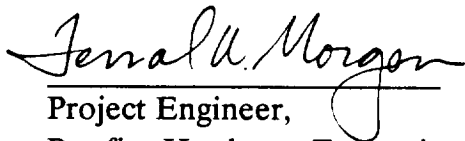
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Hardware Evaluation Report
RSRM-28 (STS-53)**


November 1993


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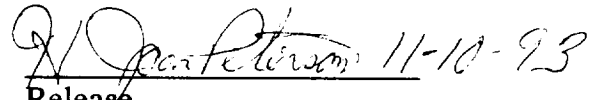

Postfire Hardware Evaluation

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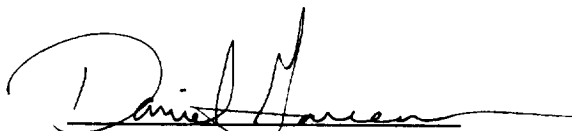

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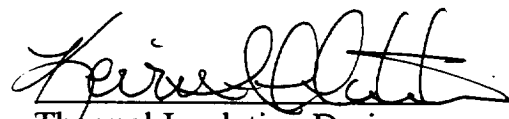

Case Design


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Joints & Seals Design


Integration Design


Nozzle Design


Igniter / Instrumentation /
Electrical Design


Thermal Insulation Design


Quality, Performance Evaluation

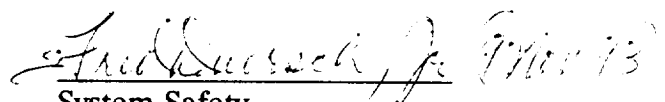
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System Safety

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C	Nozzle PFORs
D	Nozzle Postfire Data
E	Insulation Postfire Safety Factor Data

<u>Acronym</u>	<u>Definition</u>
CCP	Carbon Cloth Phenolic
CEI	Contract End Item
ET	External Tank
GCP	Glass Cloth Phenolic
HDI	High Density Indication
ID	Inside Diameter
IFA	In-Flight Anomaly
KSC	Kennedy Space Center
LDA	Low Density Anomaly
LDI	Low Density Indication
LH	Left Hand
NASA	National Aeronautics and Space Administration
OD	Outside Diameter
PEEP	Postflight Engineering Evaluation Plan
PFAR	Postfire Anomaly Record
PFOR	Postfire Observation Record
RH	Right Hand
RSRM	Redesigned Solid Rocket Motor
RTV	Room Temperature Vulcanized (Rubber)
S&A	Safe and Arm Device
SCP	Silica Cloth Phenolic
SII	SRM Ignition Initiator
SPR	Significant Problem Report
STS	Space Transportation System
TWR	Thiokol Wasatch Report

1.0 INTRODUCTION

This document is the final report for the Clearfield disassembly evaluation and a continuation of the KSC postflight assessment for the RSRM-28 (STS-53) RSRM flight set. All observed hardware conditions were documented on PFORs and are included in Appendices A through C. Appendices D and E contain the measurements and safety factor data for the nozzle and insulation components. This report, along with the KSC Ten-Day Postflight Hardware Evaluation Report (TWR-64215), represents a summary of the RSRM-28 hardware evaluation. The as-flown hardware configuration is documented in TWR-63638. Disassembly evaluation photograph numbers are logged in TWA-1989.

The RSRM-28 flight set disassembly evaluations described in this document were performed at the RSRM Refurbishment Facility in Clearfield, Utah. The final factory joint demate occurred on July 15, 1993. Additional time was required to perform the evaluation of the stiffener rings per Special Issue 4.1.5.2 because of the washout schedule. The release of this report was after completion of all Special Issues per Program Management direction.

Detailed evaluations were performed in accordance with the Clearfield PEEP, TWR-50051, Revision A. All observations were compared against limits that are also defined in the PEEP. These limits outline the criteria for categorizing the observations as acceptable, reportable, or critical. Hardware conditions that were unexpected and/or determined to be reportable or critical were evaluated by the applicable team and tracked through the PFAR system.

Figure 1 shows the RSRM Case Configuration.

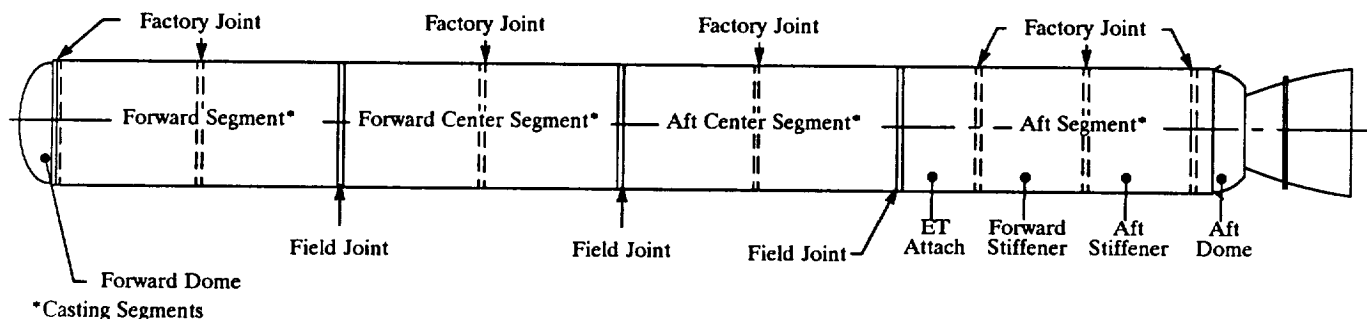


Figure 1. Case Configuration

2.0 REFERENCES

The following documents are referenced herein:

CPW1-3600A	Prime Equipment End Item Detail Specification, Part I of Two Parts; Performance, Design, and Verification Requirements, Space Shuttle Redesigned Solid Rocket Motor CPW1-3600 For Space Shuttle Solid Rocket Motor Project, Operational Flight Motors (RSRM-4 and subsequent)
TWA-1989	RSRM-28, STS-53, Clearfield Postflight Photo Log
TWR-50050	KSC Postflight Engineering Evaluation Plan (PEEP)
TWR-50051	Clearfield Postflight Engineering Evaluation Plan (PEEP)
TWR-63638	STS-53, RSRM-28, KSC Processing Configuration and Data Report
TWR-64213	Postflight Hardware Special Issues, RSRM-28 (STS-53), Clearfield
TWR-64215	KSC Ten-Day Postflight Hardware Evaluation Report, RSRM-28 (STS-53)
TWR-64217	RSRM-28 (STS-53) Postflight Assessment at KSC/Clearfield
TWR-64222	Final Postflight Hardware Evaluation Report, RSRM-29 (STS-54)

3.0 EVALUATION SUMMARY

Table I provides a summary of all postflight-related Squawks/Preliminary PFARs, PFARs, IFAs, and SPRs for RSRM-28.

Table I. Summary of RSRM-28 Problems				
	<u>Squawks/Prelim. PFARs</u>	<u>PFARs</u>	<u>IFAs</u>	<u>SPRs</u>
KSC	12	7	0	0
Clearfield	<u>12</u>	<u>4</u>	<u>0</u>	<u>0</u>
Total	24	11	0	0

A list of all RSRM-28 PFARs is included in Table II. This includes Squawks (written at KSC) and Preliminary PFARs (written at Clearfield) that were written and not elevated to PFARs. Information relating to postflight Squawks can be found in TWR-64215.

3.1 CEI Specification Compliance

Based on hardware evaluations at KSC and Clearfield, as defined in the respective PEEPs (TWR-50050, Revision C and TWR-50051, Revision A), all CEI (CPW1-3600A) motor performance requirements were met.

Table II. Problem Summary for RSRM-28

PFAR/SQUAWK/ PRELIM. PFAR NUMBER	TYPE	ELEVATED FROM	SPR NUMBER	IFA NUMBER	EVALUATION LOCATION	COMPONENT	SPAT/ APRB DATE	DESCRIPTION
53-010	SQUAWK	N/A	N/A	N/A	KSC	CASE	12/05/92	BUBBLED PAINT ON AFT SEGMENT CASE ACREAGE
53-011	SQUAWK	N/A	N/A	N/A	KSC	JPS/TPS	12/05/92	MISSING KSWA ON FJPS OF RH FORWARD FIELD JOINT
53-013	SQUAWK	N/A	N/A	N/A	KSC	NOZZLE	12/07/92	SPLASHDOWN DAMAGE TO JOINT 1 PRIMARY O-RING
53-014	SQUAWK	N/A	N/A	N/A	KSC	SEAL SURF.	12/09/92	CHATTER MARKS ON FEC (JOINT 1) SECONDARY SEAL SURFACE
53-030	SQUAWK	N/A	N/A	N/A	KSC	JPS/TPS	12/17/92	PITTING ON FORWARD SEGMENT TANG O.D. AT FIELD JOINT HEATER SPOT BOND LOCATIONS
53C-01	PRELIM.	N/A	N/A	N/A	H-5/H-7	NOZZLE	12/15/92	SLAG DAMAGE ON BEARING PROTECTOR AND FLEX BOOT
53C-02	PRELIM.	N/A	N/A	N/A	H-5/H-7	NOZZLE	12/16/92	BUBBLED PAINT ON FORWARD END RING
53C-03	PRELIM.	N/A	N/A	N/A	H-5/H-7	NOZZLE	12/16/92	BUBBLED PAINT ON FORWARD END RING
53C-05	PRELIM.	N/A	N/A	N/A	H-5/H-7	NOZZLE	12/17/92	BUBBLED PAINT ON THROAT HOUSING
53C-06	PRELIM.	N/A	N/A	N/A	H-5/H-7	NOZZLE	12/17/92	ABNORMAL FIXED HOUSING METAL-TO-ADHESIVE BONDLINE FAILURE MODE
53C-07	PRELIM.	N/A	N/A	N/A	H-5/H-7	NOZZLE	12/18/92	ABNORMAL FIXED HOUSING METAL-TO-ADHESIVE BONDLINE FAILURE MODE
53C-08	PRELIM.	N/A	N/A	N/A	H-5/H-7	IGNITER	12/21/92	THREAD DAMAGE ON ARMING MONITOR SAFING PIN RETAINER
53C-12	PRELIM.	N/A	N/A	N/A	H-5/H-7	INSULATION	03/24/93	FORWARD SEGMENT ACREAGE INSULATION COMPLIANCE SAFETY FACTOR VIOLATION
360L028A-01	PFAR	53-020	N/A	N/A	KSC	SEAL SURF.	12/23/92	SCRATCH ON FIXED HOUSING RADIAL BOLT HOLE SPOTFACE SEALING SURFACE
360L028A-02	PFAR	53-021	N/A	N/A	KSC	SEALS	12/23/92	GRINDING MARKS ON NOZZLE-TO-CASE JOINT PACKINGS WITH RETAINERS
360L028A-03	PFAR	53-022	N/A	N/A	KSC	NOZZLE	12/23/92	DAMAGE TO THREADED HOLE ON AFT EXIT CONE (JOINT 1)
360L028A-04	PFAR	53-026	N/A	N/A	KSC	SEAL SURF.	12/23/92	SCRATCH ON IGNITER ADAPTER SEAL SURFACE
360L028A-05	PFAR	53-027	N/A	N/A	KSC	SEAL SURF.	12/23/92	SCRATCHES ON AFT FIELD JOINT CLEVIS CAPTURE FEATURE SEAL SURFACE
360L028B-06	PFAR	53-028	N/A	N/A	KSC	SEALS	12/23/92	CIRCUMFERENTIAL ID SCRATCH ON AFT FIELD JOINT LEAK CHECK PLUG O-RING
360L028B-07	PFAR	53-029	N/A	N/A	KSC	CASE	12/23/92	INCORRECT FIELD JOINT SHIMS
360L028A-08	PFAR	53C-04	N/A	N/A	H-5/H-7	NOZZLE	12/23/92	BUBBLED PAINT ON THROAT HOUSING
360L028A-09	PFAR	53C-09	N/A	N/A	H-5/H-7	SEALS	12/23/92	CUT IN 126-DEGREE BARRIER-BOOSTER LEAK CHECK PLUG O-RING
360L028B-10	PFAR	53C-10	N/A	N/A	H-5/H-7	SEALS	12/23/92	CUT IN 126-DEGREE BARRIER-BOOSTER LEAK CHECK PLUG O-RING
360L028A-11	PFAR	53C-11	N/A	N/A	H-5/H-7	NOZZLE	02/10/93	SOFT ADHESIVE IN NOSE INLET ASSEMBLY BONDLINE

4.0 COMPONENT EVALUATIONS

The following sections detail, by component, the hardware conditions observed at Clearfield.

4.1 Insulation

Internal insulation evaluations of the igniters, case acreage, joints, and liners are summarized in the following sections. PFORs documenting the observations are found in Appendix A. Only the LH motor was evaluated as specified in the Clearfield PEEP.

4.1.1 Thermal Performance Evaluation

Summaries of the safety factors for the nozzle-to-case joint, field joint, factory joint, case acreage and igniter adapter insulation are found in Table III through Table VI, respectively. All safety factors for these areas can be found in Appendix E, Tables E-I through E-XI. All joint insulation regions, including factory joints, must meet a minimum safety factor of 2.0. A minimum safety factor of 1.5 is required in the acreage insulation regions.

Preliminary PFAR 53C-12 was written for an apparent CSF violation on the LH forward segment (see Table 5). The apparent violation occurred at the 371.0 inch station. The prefire data at that location appeared to be in error, resulting in an inflated material decomposition depth. All other safety factors were within CEI specification limits. All thermal protection requirements were met.

4.1.2 Internal Insulation Samples

The Clearfield PEEP specified that removal of standard insulation samples was not required on RSRM-28. Aft dome samples were removed per Special Issues (see Section 4.1.5.1).

Table III. Summary of RSRM-28 Nozzle-to-Case Joint and Field Joint Insulation Safety Factors

<u>Joint</u>	<u>Min. Compliance Safety Factor (CSF) *</u>	<u>Degree Location</u>	<u>Min. Actual Safety Factor (ASF) *</u>	<u>Degree Location</u>
Nozzle-to-Case Joint, LH	3.6	0.0, 46.8	4.1	0.0, 46.8
Aft Field Joint, LH	5.2	136.0	5.5	136.0
Center Field Joint, LH	14.5	136.0	15.3	136.0
Forward Field Joint, LH	15.3	90.0	16.2	90.0

* Minimum required joint insulation safety factor is 2.0.

Table IV. Summary of RSRM-28 Factory Joint Insulation Safety Factors

<u>Joint</u>	<u>Station (inches)</u>	<u>Min. Compliance Safety Factor (CSF) *</u>	<u>Degree Location</u>	<u>Min. Actual Safety Factor (ASF) *</u>	<u>Degree Location</u>
Aft Dome/ Stiffener, LH	56.0	3.83	0.0	4.57	0.0
Stiffener/ Stiffener, LH	177.7	2.62	0.0	4.00	0.0
Stiffener/ET Attach, LH	299.1	3.41	180.0	5.62	180.0
Aft Center, LH	161.4	2.88	270.0	7.38	270.0
Forward Center, LH	161.4	3.15	0.0	7.48	0.0
Forward Cylinder/ Cylinder, LH	162.0	2.91	154.0	4.16	154.0
Forward Dome/ Cylinder, LH	321.0	2.53	154.0	3.06	154.0

* Minimum required joint insulation safety factor is 2.0.

Table V. Summary of RSRM-28 Case Acreage Insulation Safety Factors

<u>Segment</u>	<u>Min. Compliance Safety Factor (CSF) *</u>	<u>Station (inches)</u>	<u>Degree Location</u>	<u>Min. Actual Safety Factor (ASF) *</u>	<u>Station (inches)</u>	<u>Degree Location</u>
Aft Dome, LH	2.63	45.0	46.8	2.89	33.0	270.0
Aft, LH	2.15	133.0	0.0	2.37	145.5	316.8
Aft Center, LH	2.23	11.0	46.0	3.03	11.0	46.0
Forward Ctr., LH	5.19	11.0	270.0	5.84	30.7	226.0
Forward, LH	1.10**	371.0	270.0	2.00	371.0	270.0

* Minimum required case acreage insulation safety factor is 1.5.

** Preliminary PFAR 53C-12 written for an apparent CSF violation

Table VI. Summary of RSRM-28 Igniter Adapter and Outer Joint Insulation Safety Factors

	<u>Min. Compliance Safety Factor (CSF) *</u>	<u>Station</u>	<u>Degree Location</u>	<u>Min. Actual Safety Factor (ASF) *</u>	<u>Station</u>	<u>Degree Location</u>
LH Adapter	2.40	11	180.0	2.87	11	180.0
RH Adapter	2.57	11	330.0	3.07	11	330.0
LH Outer Joint	3.38	403.0 in.	90.0	3.81	403.0 in.	90.0

* Minimum required safety factors are 1.5 for the igniter adapter acreage and 2.0 for the igniter joints.

4.1.3 Liner

Detailed liner maps are included in Appendix A. The remaining liner patterns were typical of past flight motors.

4.1.4 Igniter Nozzle Insert

LH

The postflight igniter nozzle insert throat diameter measurements were 6.350 inches at 0 degrees, 6.318 inches at 60 degrees, and 6.390 inches at 120 degrees. Using the maximum postfire measurement provides a thermal factor of safety of 8.7.

RH

The postflight igniter nozzle insert throat diameter measurements were 6.311 inches at 0 degrees, 6.360 inches at 60 degrees, and 6.305 inches at 120 degrees. Using the maximum postfire measurement provides a thermal factor of safety of 10.9.

4.1.5 Results of Special Issues and Concerns (Insulation)

TWR-64213 identified areas for special evaluation of RSRM-28 at Clearfield. The insulation issues are listed below with their respective results.

- 1. Condition:** Density variations in the RSRM-29A aft dome C/F EPDM were noted during x-ray inspection. This condition is to be compared with a nominal layup such as RSRM-28. The RSRM-28 aft dome samples will be dissected and compared to RSRM-29A.

Results: Samples were removed from the LH aft dome at 0, 120, and 240 degrees. The aft segment was x-rayed preflight and was found to be normal with no density variations. These samples will be retained and compared with RSRM-29A. Results are to be documented in TWR-64222.

- 2. Condition:** Chemlok primer and adhesive now extends to the ends of the stiffener rings (under the splice plates) so that all bare metal is covered.

Results: Five of the nine stiffener rings from the LH side and six of the nine from the RH side were washed out and evaluated at the Clearfield H-7 facility. The remaining seven stiffener rings had not yet been washed out and will not be evaluated. None of the eleven stiffener rings that were evaluated showed any evidence of corrosion in the Chemloked areas.

4.2 Case, Seals, and Joints

Seal and joint evaluations of the S&As, factory joints, internal nozzle joints, ports, and port plugs were performed. PFORs documenting the observations are found in Appendix B.

4.2.1 S&As

Figure 2 shows the Safe and Arm device (S&A) configuration. The S&As were disassembled on December 21, 1992 at the Clearfield H-5 facility.

One anomalous condition was observed. Minor thread damage (two small dings) was observed on the first thread of the safing pin retainer (arming monitor). Small metal shavings were present in the safing pin retainer cap. (See Preliminary PFAR 53C-08.)

4.2.2 Factory Joints

The factory joints were inspected by Quality Assurance at Clearfield. All fourteen factory joints were in good condition with no heavy corrosion reported on any of the joints. No O-ring heat effects or erosion were observed.

4.2.3 Internal Nozzle Joints

Details can be found in Section 4.3.

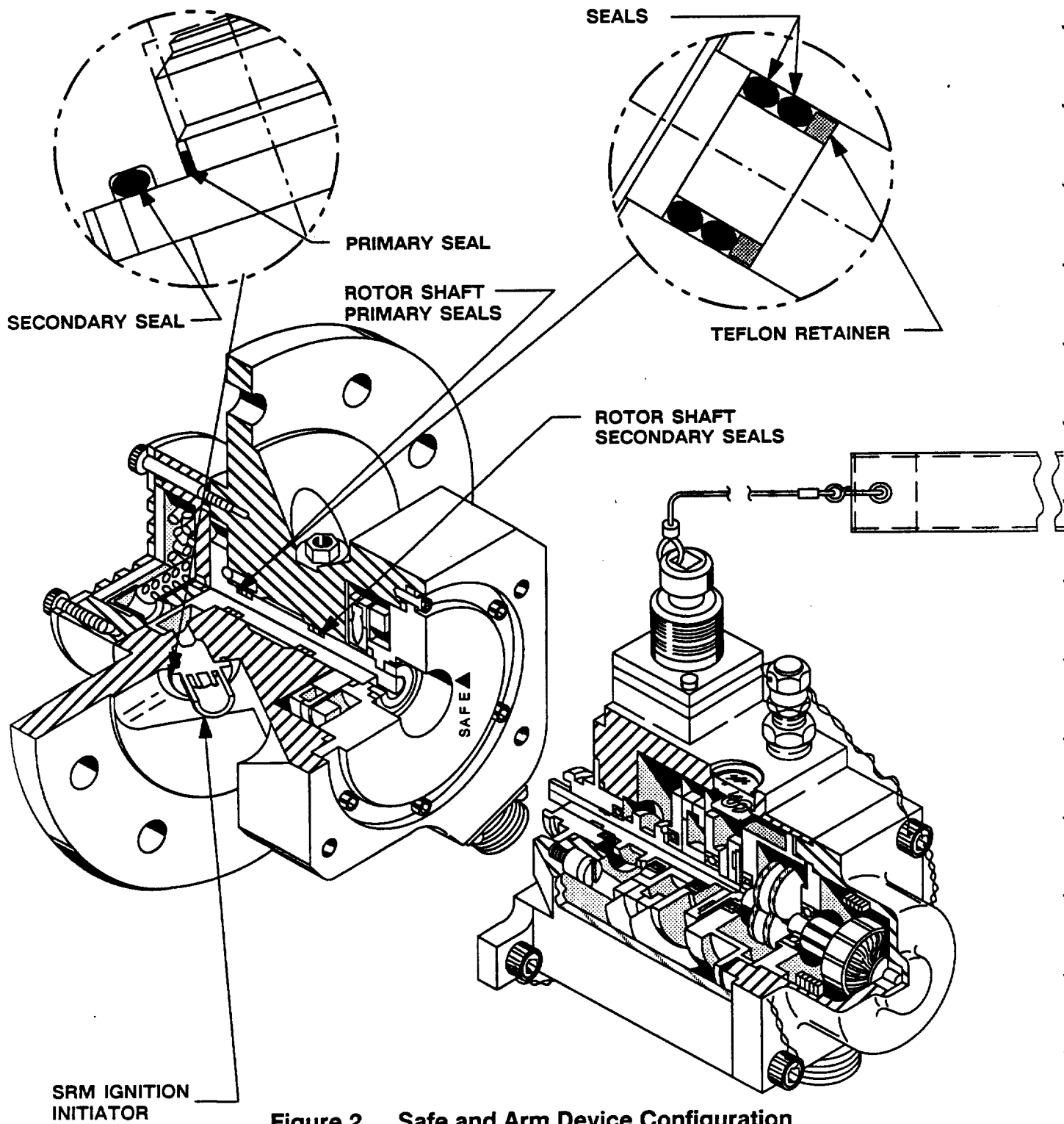


Figure 2. Safe and Arm Device Configuration

4.2.4 Ports and Port Plugs

Plug breakaway and running torques are documented on PFORs in Appendix B.

S&As

Two anomalous conditions were observed. Two cuts were seen on the LH 126-degree barrier-booster leak check plug O-ring OD. The first cut measured 0.015 inch long and did not leave a flap of material. The second cut left a flap of material and measured 0.025 inch circumferentially and 0.030 inch axially. (See Preliminary PFAR 53C-09.) One cut was observed on the RH 126-degree barrier-booster leak check plug O-ring OD. The cut measured 0.005 inch circumferentially and 0.010 inch axially. (See Preliminary PFAR 53C-10.)

Factory Joints

No anomalous conditions were observed on any of the factory joint leak check ports, plugs, or O-rings.

Internal Nozzle Joints

No anomalous conditions were observed on any of the internal nozzle joint leak check ports, plugs, or O-rings.

4.2.5 Results of Special Issues and Concerns (Case, Seals, and Joints)

TWR-64213 identified areas for special evaluation of RSRM-28 at Clearfield. The case, seals, and joints issues are listed below with their respective results.

- 1. Condition:** Corrosion (pitting) has been documented in previous case Y-joint regions. Minimization of corrosion on future hardware is desirable.

Results: Assessment was not done.

- 2. Condition:** The Joint 5 (LH) low pressure leak rate was the highest seen to date (0.076 sccs) but was within the specification limit (0.082 sccs).

Results: No anomalous conditions were observed and grease application was nominal.

- 3. Condition:** The 306-degree leak check plug in the LH and RH Barrier-Booster housings (S&A joint) was removed at KSC. The plugs and ports were evaluated at KSC and observations were documented in the KSC Ten-Day Report (TWR-64215). Plastic protective caps were installed into the exposed ports.

Results: No further assessment of the LH or RH 306-degree leak plugs, ports, or O-rings was required at Clearfield.

4.3 Nozzle

Figure 3 shows the internal nozzle joint configuration. Also shown in Figure 3 are the materials used in the nozzle. The internal nozzle joints were disassembled on December 15 and 16, 1992 at the Clearfield H-6 facility.

The condition of the RSRM-28 nozzle internal joints was generally typical of previous flight nozzles. RTV was below the char line in all joints. The primary and secondary O-rings in all joints showed no signs of blowby, erosion, or heat effects. There was no significant metal hardware damage.

The following sections provide detailed assessments of nozzle internal joints, bondlines, char and erosion performance, flex boot, bearing protector, and flex bearing performance, and throat erosion data. The outcome of special issues and concerns for this nozzle flight set is also presented. PFORs documenting the observations are found in Appendices B and C.

4.3.1 Nose Inlet/Forward End Ring/Cowl (Joint 2)

LH

No anomalous conditions were observed. Typical scalloped shaped soot was observed to the bolt hole circle intermittently full circumference. Soot reached the primary O-ring intermittently full circumference. No O-ring or seal surface damage was observed, with the exception of one burnish mark caused by disassembly on the nose inlet housing secondary seal surface.

The forward end ring OD had intermittent bubbled paint full circumference (0.10 inch diameter maximum). Both the top coat and primer were bubbled. A clear liquid was present in the bubbles. There was no corrosion or signs of heat affect. (See Preliminary PFAR 53C-02.)

The RTV coverage was nominal with typical mixing of RTV and adhesive. Typical soot entered the joint between layers of RTV and adhesive.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Medium-to-heavy corrosion was observed on the forward end chamfer of the cowl housing from 205-to-305 degrees. Intermittent medium-to-heavy corrosion was observed on the ID of cowl housing flange full circumference. Light corrosion was observed on the forward end ring flange forward face full circumference. No metal damage was observed.

No separations were observed on the cowl assembly or aft end of the nose cap.

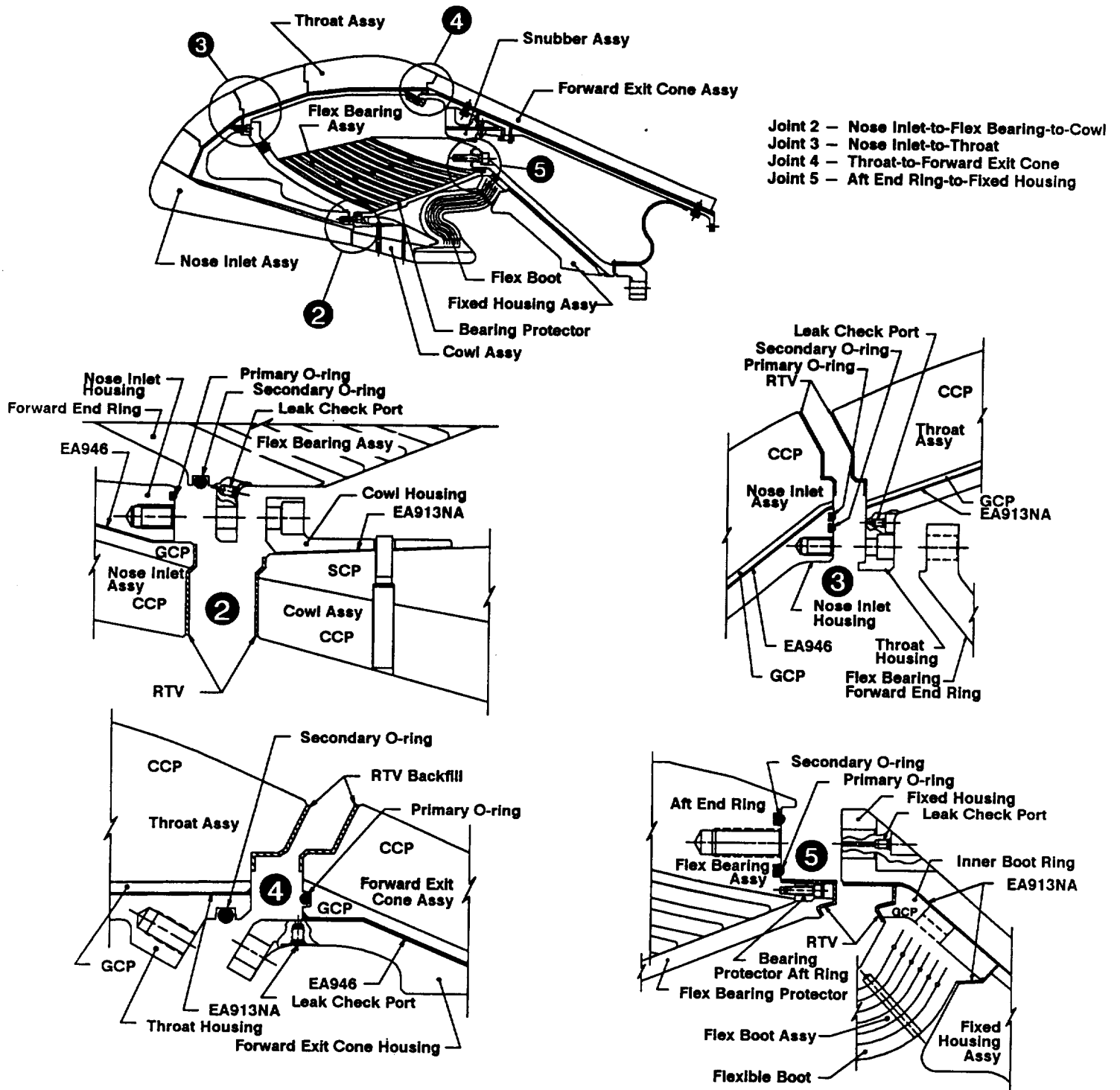


Figure 3. Internal Nozzle Joint Configuration

RH

No anomalous conditions were observed. Soot reached the primary O-ring intermittently from 90-to-185 degrees. No O-ring or seal surface damage was observed.

The forward end ring OD had intermittent bubbled paint full circumference (0.10 inch diameter maximum). Both the top coat and primer were bubbled. A clear liquid was present in the bubbles. There was no corrosion or signs of heat affect. (See Preliminary PFAR 53C-03.)

The RTV coverage was nominal with typical mixing of RTV and adhesive. Typical soot entered the joint between layers of RTV and adhesive.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Medium-to-heavy corrosion was observed on the forward end chamfer of the cowl housing from 28-to-35, 93-to-118, 190-to-202, and 230-to-240 degrees. Intermittent medium-to-heavy corrosion was observed on the ID of the cowl housing flange full circumference. Intermittent light corrosion was observed on the forward end ring flange forward face outboard of the secondary O-ring groove. Intermittent light-to-medium corrosion was observed on the nose inlet housing aft face full circumference inboard of the secondary O-ring groove. No metal damage was observed.

No separations were observed on the cowl assembly or aft end of the nose cap.

4.3.2 Nose Inlet/Throat (Joint 3)

LH

One anomalous conditions was observed. No O-ring or seal surface damage was observed.

RTV was below the char line over the complete circumference. No gas paths were observed in the joint.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Intermittent light-to-medium corrosion was observed inboard of the primary O-ring groove on both the nose inlet and throat housings. Intermittent bubbled paint (0.08 inch diameter maximum) was observed on the OD surface of the throat housing flange with clear fluid in the bubbles. Both the topcoat and primer were bubbled. No corrosion or signs of heat affect were present in the bubbled regions. (See Preliminary PFAR 53C-04.) No metal damage was observed.

No separations were observed on the nose inlet assembly. The forward end of the throat assembly was separated full circumference metal-to-adhesive with a maximum radial width of 0.010 inch.

RH

One anomalous condition was observed. No O-ring or seal surface damage was observed.

RTV was below the char line over the complete circumference. No gas paths were observed in the joint.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Intermittent light-to-medium corrosion was observed inboard of the primary O-ring groove on both the nose inlet and throat housings. Intermittent bubbled paint (0.05 inch diameter maximum) was observed on the OD surface of the throat housing. No fluid was found in the bubbles. No corrosion or signs of heat affect were present in the bubbled regions. (See Preliminary PFAR 53C-05.) No metal damage was observed.

No separations were observed on the nose inlet assembly. The forward end of the throat assembly was separated full circumference metal-to-adhesive with a maximum radial width of 0.015 inch.

4.3.3 Throat/Forward Exit Cone (Joint 4)

LH

No anomalous conditions were observed. No O-ring or seal surface damage was observed.

RTV was below the char line over the complete circumference of the joint. No gas paths were observed in the joint. RTV reached the primary O-ring at 37.5-to-165 and 247.5-to-347.5 degrees. Grease did not interfere with the RTV backfill.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Light-to-medium corrosion was observed on the throat housing between the primary and secondary O-rings full circumference. Light-to-medium corrosion was observed on the forward exit cone between the phenolic and secondary O-ring footprint full circumference. No metal damage was observed.

The forward end of the forward exit cone assembly was separated metal-to-adhesive at 262.5-0-247.5 degrees with a maximum radial width of 0.050 inch. The aft end of the throat assembly was separated full circumference metal-to-adhesive with a maximum radial width of 0.010 inch.

RH

No anomalous conditions were observed. No O-ring or seal surface damage was observed.

RTV was below the char line over the complete circumference of the joint. No gas paths were observed in the joint. RTV reached the primary O-ring at 105-to-362.5 degrees. Grease did not interfere with the RTV backfill.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Light corrosion was observed on the throat housing between the primary and secondary O-rings intermittently full circumference. Intermittent light-to-medium corrosion was observed on the forward exit cone between the phenolic and secondary O-ring footprint intermittently full circumference. No metal damage was observed.

The forward end of the forward exit cone assembly was separated metal-to-adhesive at 200-310 degrees with a maximum radial width of 0.040 inch. The aft end of the throat assembly was separated full circumference metal-to-adhesive with a maximum radial width of 0.010 inch.

4.3.4 Flex Bearing/Fixed Housing (Joint 5)

LH

One anomalous condition was observed. No metal damage or rounded chamfers were observed on the Packing with Retainer spotfaces. Metal shavings were observed on several of the bolts towards the end of the bolt near the Nylok patch. All 72 Packings with Retainers had typical disassembly damage to the elastomer. No O-ring or seal surface damage was observed.

The RTV coverage was nominal with intermittent voids due to the assembly process. No gas paths were observed in the joint. RTV was observed to the primary O-ring at 20-to-85 and 205-to-260 and degrees.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Intermittent medium corrosion was observed on the in-board aft tip of the aft end ring full circumference. No metal damage was observed

No separations were observed between the inner boot ring and the fixed housing.

Bubbles were observed on the ID surface of the cowl segments at 90-to-170 degrees. The mode of separation was 10 percent metal-to-adhesive, 70 percent adhesive-to-segments, and 20% cohesive within the segments.

There was typical even sooting on the bearing protector and the flex boot ID. Erosion was observed on the bearing protector aft of the belly band at 150 and 178-to-185 degrees. Corresponding areas were also observed on the flex boot in the same locations. It appeared that slag was trapped between the boot and bearing protector. Slag was found in the boot cavity. (See Preliminary PFAR 53C-01.)

RH

No anomalous conditions were observed. No metal damage or rounded chamfers were observed on the Packing with Retainer spotfaces. All 72 Packings with Retainers had typical disassembly damage to the elastomer. No O-ring or seal surface damage was observed.

The RTV coverage was nominal with intermittent voids due to the assembly process. No gas paths were observed in the joint. RTV was observed to the primary O-ring at 170-to-195 and 335-0-8 degrees.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Intermittent medium corrosion was observed on the in-board aft tip of the aft end ring full circumference. No metal damage was observed.

No separations were observed between the inner boot ring and the fixed housing.

Bubbles were observed on the ID surface of the cowl segments at 195-to-210 and 355-0-55 degrees. The mode of separation was 10 percent metal-to-adhesive, 85 percent adhesive-to-segments, and 5% cohesive within the segments.

There was typical even sooting on the bearing protector and the flex boot ID.

4.3.5 Aft Exit Cone Assembly Bondlines

LH

The primary mode of separation was 100 percent within the GCP. The secondary mode was 6.25 percent metal-to-adhesive, 1.25 percent within the adhesive, and 92.5 percent adhesive-to-GCP. No corrosion was observed on the aft exit cone shell. Seven adhesive voids were observed with a diameter greater than 0.5 inch. Intermittent small voids (0.15 inch diameter maximum) were seen throughout the polysulfide. One "V"-shaped void was observed at 195 degrees and extended 0.40 inch maximum forward from the aft end of the groove.

RH

The primary mode of separation was 100 percent within the GCP. The secondary mode was 4.75 percent metal-to-adhesive, 1.75 percent within the adhesive, and 93.5 percent adhesive-to-GCP. No corrosion was observed on the aft exit cone shell. Ten adhesive voids were observed with a diameter greater than 0.5 inch. Intermittent small voids (0.10 inch diameter maximum) were seen throughout the polysulfide.

4.3.6 Forward Exit Cone Assembly Bondlines

LH

The mode of separation was 11.25 percent metal-to-adhesive, 15 percent within the adhesive, and 73.75 percent adhesive-to-GCP. Medium-to-heavy corrosion was present on the forward exit cone housing in areas of metal-to-adhesive separation. Ten adhesive voids were observed with a diameter greater than 0.5 inch.

RH

The mode of separation was 8.25 percent metal-to-adhesive, 15 percent within the adhesive, and 76.75 percent adhesive-to-GCP. Medium-to-heavy corrosion was present on the forward exit cone housing in areas of metal-to-adhesive separation. Thirteen adhesive voids were observed with a diameter greater than 0.5 inch.

4.3.7 Throat Assembly Bondlines

LH

The throat inlet ring and throat ring mode of separation was 98.4 percent metal-to-adhesive and 1.6 percent adhesive-to-GCP. Medium-to-heavy corrosion was present on the throat housing full circumference except in the areas of adhesive-to-GCP bondline separation. Two adhesive voids were observed with a diameter greater than 0.5 inch.

RH

The throat inlet ring and throat ring mode of separation was 95 percent metal-to-adhesive, 0.6 percent adhesive-to-GCP, and 4.4 percent GCP-to-CCP. Medium-to-heavy corrosion was present on the throat housing full circumference. Four adhesive voids were observed with a diameter greater than 0.5 inch.

4.3.8 Nose Inlet Rings (-503, -504) Bondlines

LH

The aft inlet ring and forward nose ring mode of separation was 98.75 percent metal-to-adhesive and 1.25 percent adhesive-to-GCP. Medium-to-heavy corrosion was present over 98 percent of the bondline. Three adhesive voids were observed with a diameter greater than 0.5 inch.

A brownish clear, tacky, foreign material was observed in an adhesive void on the forward nose ring-to-housing interface at 344 degrees (see Preliminary PFAR 53C-11).

RH

The aft inlet ring and forward nose ring mode of separation was 96.25 percent metal-to-adhesive, 0.63 percent within the adhesive, and 3.12 percent adhesive-to-GCP. Medium-to-heavy corrosion was present over 95 percent of the bondline. Two adhesive voids were observed with a diameter greater than 0.5 inch.

4.3.9 Nose Cap Bondlines

LH

The primary mode of separation was 5 percent within GCP and 95 percent CCP-to-GCP. The secondary mode of separation was 27 percent metal-to-adhesive, 0.5 percent within the adhesive, and 72.5 percent adhesive-to-GCP. Light-to-medium corrosion was present on the nose inlet housing on the forward 1.0 inch maximum intermittently around 75 percent of the circumference and aft 3.25 inches maximum full circumference. No adhesive voids were observed with a diameter greater than 0.5 inch.

RH

The primary mode of separation was 100 percent GCP-to-CCP. The secondary mode of separation was 22.5 percent metal-to-adhesive and 77.5 percent adhesive-to-GCP. Light-to-medium corrosion was present on the nose inlet housing on the aft 2.75 inches maximum full circumference and on the forward 1.0 inch maximum intermittently around 60 percent of the circumference. No adhesive voids were observed with a diameter greater than 0.5 inch.

4.3.10 Cowl Bondlines

LH

The mode of separation was 100 percent metal-to-adhesive. Medium-to-heavy corrosion was present on the cowl housing full circumference. Three adhesive voids were observed with a diameter greater than 0.5 inch.

RH

The mode of separation was 100 percent metal-to-adhesive. Medium-to-heavy corrosion was present on the cowl housing full circumference. Five adhesive voids were observed with a diameter greater than 0.5 inch.

4.3.11 Fixed Housing Assembly Bondlines

LH

The mode of separation was 39 percent metal-to-adhesive, 40 percent adhesive-to-GCP, and 21 percent within GCP. Preliminary PFAR 53C-06 was written because the metal-to-adhesive separation exceeded 15 percent. The secondary mode of separation was 2.5 percent metal-to-adhesive and 97.5 adhesive-to-GCP. Four indications were detected with ultrasonic inspection. Two of the four indications were found during bondline evaluation. No corrosion was observed on the housing. Nine adhesive voids were observed with a diameter greater than 0.5 inch. Intermittent adhesive voids with diameters of 0.30 inch or smaller were also seen.

RH

The primary mode of separation was 54.5 percent metal-to-adhesive, 21.75 percent adhesive-to-GCP, and 23.75 percent within GCP. Preliminary PFAR 53C-07 was written because the metal-to-adhesive separation exceeded 15 percent. The secondary mode of separation was 10 percent metal-to-adhesive and 90 percent adhesive-to-GCP. Eight indications were detected with ultrasonic inspection. Two of the eight indications were found during bondline evaluation. No corrosion was observed on the housing. Three adhesive voids were observed with a diameter greater than 0.5 inch.

4.3.12 Ultrasonic Inspection of Fixed Housing Assemblies

Ultrasonic inspection was conducted on both of the fixed housing assemblies. Four indications were found on the LH fixed housing and eight indications were found on the RH fixed housing. A summary of the ultrasonic inspection results/maps is documented in memo 8272-FY93-M093.

4.3.13 Char and Erosion Performance

Char and erosion margins of safety are summarized in Table VII. The char and erosion data tables for each component liner can be found in Tables D-I through D-XII of Appendix D. Measurement stations that contain an "NA" means that data was not available due to missing material. The aft exit cone liners were not recovered and therefore are not included. All stations showed positive margins of safety. The measurement stations can be found in Figure D-1.

Table VII. RSRM-28 Nozzle Char and Erosion Minimum Margins of Safety Summary

<u>Hardware</u>	<u>Stations*</u>												
Forward Exit Cone Assembly, LH	1	4	4.6	8	12	16	20	24	28	32	32.9	34	
	0.26	0.25	0.23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Forward Exit Cone Assembly, RH	1	4	4.6	8	12	16	20	24	28	32	32.9	34	
	0.28	0.30	0.25	0.16	0.49	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Throat Assembly, LH	1	2	4	6	8	10	12	14	16	18	20	22	23
	0.23	0.16	0.22	0.16	0.08	0.20	0.26	0.31	0.39	0.32	0.43	0.57	0.40
Throat Assembly, RH	1	2	4	6	8	10	12	14	16	18	20	22	23
	0.13	0.17	0.17	0.11	0.07	0.17	0.23	0.27	0.38	0.37	0.45	0.46	0.32
Nose Inlet Rings (-503, -504), LH	28	30	32	34	36	38	39						
	0.10	0.23	0.18	0.38	0.32	0.14	0.08						
Nose Inlet Rings (-503, -504), RH	28	30	32	34	36	38	39						
	0.14	0.28	0.17	0.32	0.32	0.15	0.12						
Nose Cap, LH	1.5	4	6	8	10	12	14	16	18	20	22	24	26
	0.43	0.46	0.52	0.61	0.61	0.69	0.63	0.60	0.55	0.47	0.11	0.02	0.09
Nose Cap, RH	1.5	4	6	8	10	12	14	16	18	20	22	24	26
	N/A	0.49	0.67	0.68	0.77	0.77	0.83	0.81	0.77	0.58	0.20	0.09	0.21
Cowl/OBR, LH	0.3	1	2	3	4	5	6	6.8	8	9	10	11.3	
	0.15	0.11	0.10	0.19	0.21	0.31	0.41	N/A	0.22	0.41	0.48	0.51	
Cowl/OBR, RH	0.3	1	2	3	4	5	6	6.8	8	9	10	11.3	
	0.26	0.24	0.20	0.21	0.24	N/A	N/A	N/A	0.30	0.42	0.51	0.38	
Fixed Housing Assembly, LH	0	1	2	3	4	5	6	7	8	9	10.75		
	1.80	0.87	0.62	0.72	0.83	0.89	1.04	1.08	1.27	2.37	0.66		
Fixed Housing Assembly, RH	0	1	2	3	4	5	6	7	8	9	10.75		
	1.88	0.64	0.79	0.76	0.78	0.78	0.83	0.99	1.16	1.48	0.67		

* Station locations are shown in bold with the margin of safety shown below.

4.3.14 Flex Boot Performance

The performance of both the LH and RH flex boots was nominal. The LH flex boot had a minimum of 3.0 NBR plies intact and the RH flex boot had a minimum of 3.0 NBR plies intact. Positive margins of safety were achieved at all measurement stations. The flex boot performance margins of safety are summarized in Table VIII.

Table VIII. RSRM-28 Flex Boot Margins of Safety

Degree Location	Left Hand			Right Hand		
	Remaining Plies	Max. Material Affected Depth (in.)	Perform- ance Margin of Safety	Remaining Plies	Max. Material Affected Depth (in.)	Perform- ance Margin of Safety
0	3.8	1.14	0.46	3.2	1.34	0.24
90	3.1	1.37	0.21	3.0	1.40	0.19
180	3.8	1.14	0.46	3.7	1.17	0.42
270	3.0	1.40	0.19	3.1	1.37	0.21

* Minimum flex boot overall prefire thickness is 2.5 inches.

4.3.15 Bearing Protector Performance

Both the LH and RH bearing protectors performed as expected during flight. Both bearing protectors were evenly sooted around the full circumference and showed typical greater erosion in-line with the cowl vent holes. There was no evidence of soot or heat effect on the flex bearing side of either bearing protector. PFOR C-9 shows the postflight bearing protector thickness measurements every ten degrees.

4.3.16 Flex Bearing Performance

LH

The flex bearing performance during flight was acceptable. Examination of the flex bearing revealed no damage, soot, heat effect, or flow indications.

RH

The flex bearing performance during flight was acceptable. Examination of the flex bearing revealed no damage, soot, heat effect, or flow indications.

4.3.17 Throat Diameter

The average LH nozzle postfire throat diameter was 55.960 inches (erosion rate of 8.53 mils/sec based on an action time of 123.1 sec). The average RH nozzle postfire throat diameter was 55.954 inches (erosion rate of 8.49 mils/sec based on an action time of 123.3 sec). RSRM postfire throat diameters have ranged from 55.787 to 56.072 inches.

4.3.18 Results of Special Issues and Concerns (Nozzle)

TWR-64213 identified areas for special evaluation of RSRM-28 at Clearfield. The nozzle issues are listed below with their respective results.

- 1. Condition:** Cuts were present in the RH flex boot rubber adjacent to the forward end of the inner boot ring. The cuts ran from 0-to-225 degrees and 300-to-359 degrees and were approximately 0.100 inch maximum depth.

Results: No evidence of abnormal separation or signs of cut propagation were observed.
- 2. Condition:** LDIs were found at the RH forward nose ring GCP-to-housing interface.

Results: A small adhesive void (0.10 inch diameter) found at 282 degrees did not correlate well with the size of the reported LDA at 283 degrees.
- 3. Condition:** LDIs were found at the RH nose cap GCP-to-housing interface.

Results: A void observed at 178 degrees correlated closely with the reported LDA at 177 degrees. No voids were observed at 244 degrees, but the hydrolase may have destroyed adhesive evidence on the nose cap.
- 4. Condition:** LDIs were found at the RH nose cap-to-forward nose ring interface.

Results: Voids in the nose cap at 13 and 267 degrees correlated closely with the reported LDAs. All other LDAs could not be found. All were in or near the char and erosion area.
- 5. Condition:** LDIs were found at the LH nose cap-to-forward nose ring interface.

Results: Voids were observed at 0, 81, and 295 degrees. The size of the voids does not correlate well with the reported LDAs but are at the char line and may have extended forward where the evidence may have eroded off.
- 6. Condition:** An HDI was found at the LH nose cap-to-forward nose ring interface.

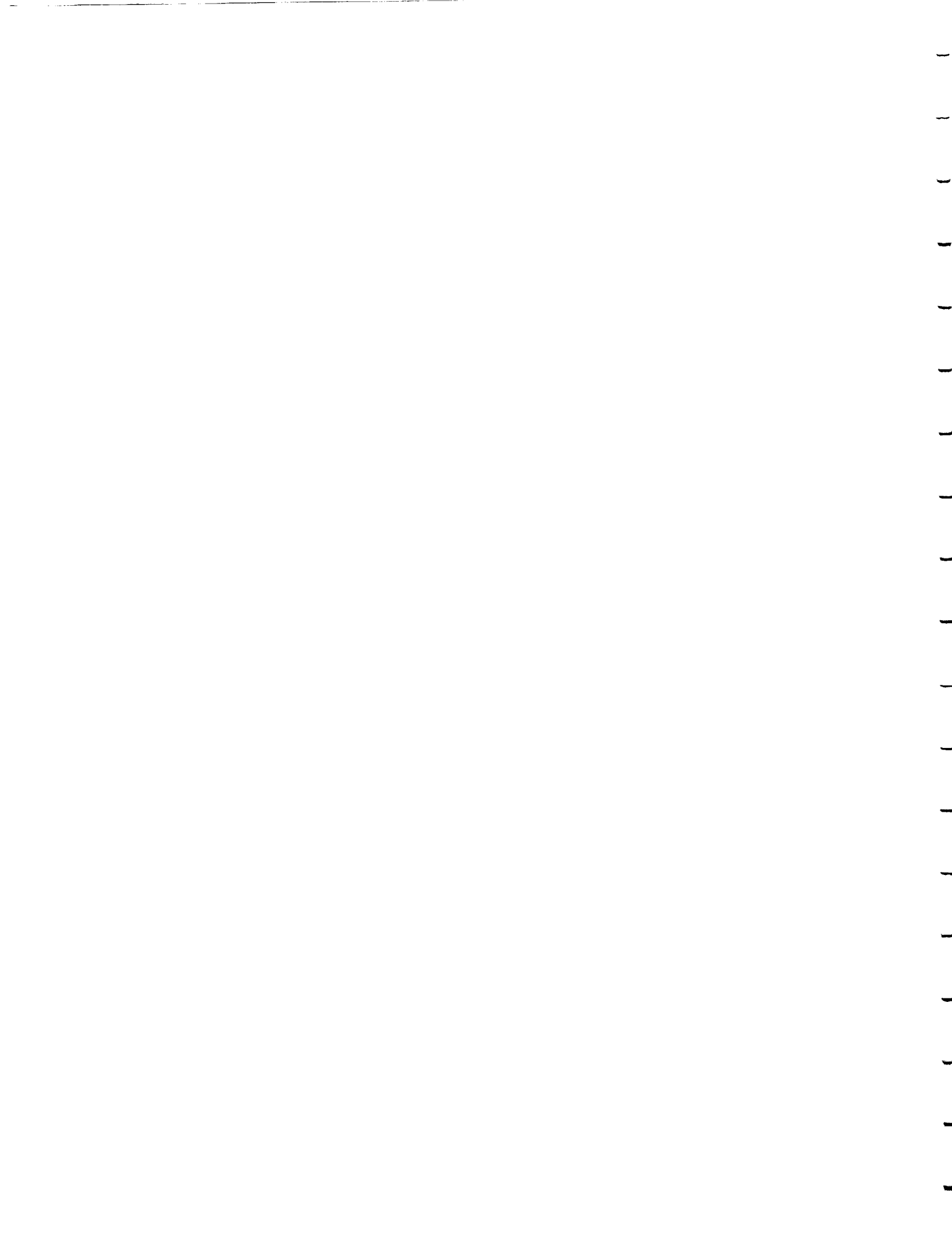
Results: No evidence of the HDI was observed.
- 7. Condition:** LDIs were found at the RH cowl SCP-to-housing interface.

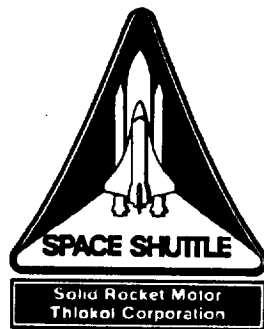
Results: All LDIs were found to be adhesive voids.
- 8. Condition:** LDIs were found at the LH cowl SCP-to-housing interface.

Results: Three of the five reported LDIs were found to be adhesive voids.

9. Condition: The LH outer boot ring had a wet line indication at 358 degrees on the aft end. The defect measured 0.300 inch circumferentially x 0.010 inch radially. The wetline was removed by hand sanding and was blended to a smooth contour. The blended area measured 1.30 inches circumferentially x 0.40 inch radially x 0.034 inch deep.

Results: No abnormal erosion was observed at the 358 degree location.





Appendix A Insulation PFORs

Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

November 1993

Prepared for:

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812**

Contract No.	NAS8-38100
DR No.	4-23
WBS No.	4C601-04-01
ECS No.	SS4771

***Thiokol* CORPORATION**
SPACE OPERATIONS

P.O. Box 707, Brigham City, Utah 84302-0707 (801) 863-3511

INSULATION REQUIRED PFOR LIST

<u>PFOR #</u>	<u>Title</u>	<u>Side</u>	<u>Joint or Location</u>	<u>Final Report Page Number</u>
A-1	Postfire Insulation CPI Log Numbers	Left	N/A	A-1
A-2	Segment Internal Insulation Condition	Left	Forward Segment	A-2
A-2	Segment Internal Insulation Condition	Left	Forward Center Segment	A-3
A-2	Segment Internal Insulation Condition	Left	Aft Center Segment	A-4
A-2	Segment Internal Insulation Condition	Left	Aft Segment	A-5
A-3	Forward Segment Liner Pattern	Left	Forward Segment	A-6
A-4	Forward Center Segment Liner Pattern	Left	Forward Center Segment	A-7
A-5	Aft Center Segment Liner Pattern	Left	Aft Center Segment	A-8
A-6	Aft Segment Liner Pattern	Left	Aft Segment	A-9
A-8	Igniter Nozzle Insert Throat Diameter Measurements	Left	Igniter Nozzle Insert	A-10
A-9	Stiffener Ring Condition	Left	Stiffener Rings	A-11

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

INSULATION REQUIRED PFOR LIST (Cont.)

<u>PFOR #</u>	<u>Title</u>	<u>Side</u>	<u>Joint or Location</u>	<u>Final Report Page Number</u>
A-1	Postfire Insulation CPI Log Numbers	Right	N/A	A-12
A-2	Segment Internal Insulation Condition	Right	Forward Segment	A-13
A-2	Segment Internal Insulation Condition	Right	Forward Center Segment	A-14
A-2	Segment Internal Insulation Condition	Right	Aft Center Segment	A-15
A-2	Segment Internal Insulation Condition	Right	Aft Segment	A-16
A-8	Igniter Nozzle Insert Throat Diameter Measurements	Right	Igniter Nozzle Insert	A-17
A-9	Stiffener Ring Condition	Right	Stiffener Rings	A-18

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

POSTFLIGHT OBSERVATION RECORD (PFOR) A-1
Postfire Insulation Common Planning Index (CPI) Log Numbers

Motor No.: 360T028	Side: Left (A)	Date: 21 JULY 1993		
Assessment Engineer(s)/Inspector(s): NORM EDDY				
Record CPI Log and Postfire Part and Serial Numbers Below:				
	P/N	PPC No.	Serial No.	CPI Log No.
A. Igniter Chamber	N/A	N/A	N/A	N/A
B. Igniter Adapter	<u>1077457-01</u>	<u>903</u>	<u>9</u>	<u>4CIBH</u>
C. Forward Segment	<u>1076790-05</u>	<u>904</u>	<u>13</u>	<u>4CFWL</u>
D. Forward Center Segment	<u>1076791-01</u>	<u>903</u>	<u>27</u>	<u>4CFWM</u>
E. Aft Center Segment	<u>1076791-01</u>	<u>903</u>	<u>26</u>	<u>4CFWM</u>
F. Aft Segment	<u>1076957-03</u>	<u>904</u>	<u>13</u>	<u>4CFWN</u>
Notes / Comments				

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): _____

REVISION _____

DOC NO. TWR-64216	VOL _____
SEC _____	PAGE A-1

POSTFLIGHT OBSERVATION RECORD (PFOR) A-2
Segment Internal Insulation Condition (After Low Pressure Rinse)

Motor No.: 360T028	Side: Left (A)	Date: 3/19/93
Assessment Engineer(s)/Inspector(s): <u>Reo Mackley</u>		
Segment: Forward		
<u>Segment Internal Insulation Observations:</u>	Yes	No
A. Abnormal Erosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Gas Paths?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Ply Separations?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
D. Abnormal Blisters?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. Abnormal Cuts or Gouges?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
F. Foreign Material Within Insulation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
G. Non-Uniformities in the Eleven Point Burn-out Pattern? (Forward Segment Only)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Comment #

Notes / Comments

- 1) A spiral pattern was worn into the insulation during the postfire rinse. The depth ranges approximately between ~~0~~ and .005 to .0030. The distance between spirals is about 9 inches. This will have no significant impact on insulation measurement. This occurrence is documented on Process Departure no. 414869.
- 2) CSF VIOLATION @ 371.0" STATION, 270°

Preliminary PFAR(s)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Preliminary PFAR Number(s): <u>53C-12</u>
Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) A-2
Segment Internal Insulation Condition (After Low Pressure Rinse)

Motor No.: 360T028	Side: Left (A)	Date: 11 June 93
Assessment Engineer(s)/Inspector(s): <u>Reo Mackley</u>		
Segment: Forward Center		
Segment Internal Insulation Observations:		
	Yes	No
A. Abnormal Erosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Gas Paths?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Ply Separations?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
D. Abnormal Blisters?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
E. Abnormal Cuts or Gouges?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
F. Foreign Material Within Insulation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
G. Liner Completely Missing? (Center Segments Only)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Notes / Comments		

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No. (s): _____

REVISION _____

POSTFLIGHT OBSERVATION RECORD (PFOR) A-2
Segment Internal Insulation Condition (After Low Pressure Rinse)

Motor No.: 360T028	Side: Left (A)	Date: 6-21-93
Assessment Engineer(s)/Inspector(s): <u>Reo Mackley</u>		
Segment: Aft Center		
Segment Internal Insulation Observations:		
	Yes	No
A. Abnormal Erosion?	_____	✓ _____
B. Gas Paths?	_____	✓ _____
C. Ply Separations?	_____	✓ _____
D. Abnormal Blisters?	_____	✓ _____
E. Abnormal Cuts or Gouges?	_____	✓ _____
F. Foreign Material Within Insulation?	_____	✓ _____
G. Liner Completely Missing? (Center Segments Only)	_____	✓ _____
Notes / Comments		
Preliminary PFAR(s)? _____ Yes _____ No ✓ _____ Preliminary PFAR Number(s): _____		
Clarification Form(s)? _____ Yes _____ No ✓ _____ Clarification Form Page No.(s): _____		

POSTFLIGHT OBSERVATION RECORD (PFOR) A-2
Segment Internal Insulation Condition (After Low Pressure Rinse)

Motor No.: 360T028	Side: Left (A)	Date: 3/8/93
Assessment Engineer(s)/Inspector(s): <i>Res Mackley</i>		
Segment: Aft		
Segment Internal Insulation Observations:		
	Yes	No
A. Abnormal Erosion?	_____	____/____
B. Gas Paths?	_____	____/____
C. Ply Separations?	_____	____/____
D. Abnormal Blisters?	_____	____/____
E. Abnormal Cuts or Gouges?	_____	____/____
F. Foreign Material Within Insulation?	_____	____/____
G. NBR Under the CF/EPDM Exposed in the Aft Dome?	_____	____/____
Comment # _____		
Notes / Comments		
Special Issue 3.1.1.1:		
<i>aft dome samples have been removed.</i> <i>SAMPLES TO BE USED IN COMPARISON OF RSRM-29 SAMPLES.</i>		

Preliminary PFAR(s)? _____ Yes ☒ No _____ Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes ☒ No _____ Clarification Form Page No.(s): _____

REVISION _____

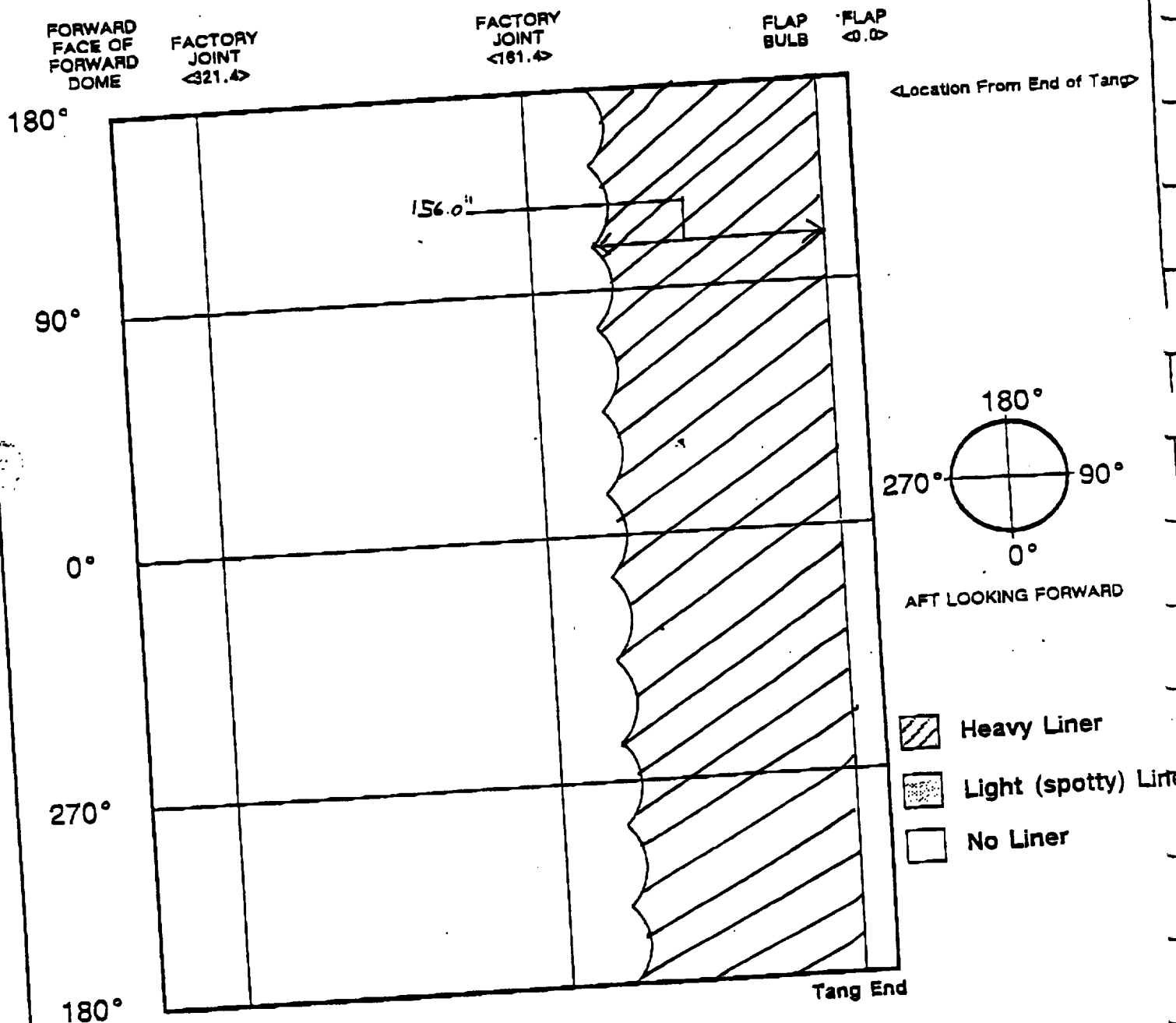
DOC NO. TWR-64216	VOL _____
SEC _____	PAGE A-5

POSTFLIGHT OBSERVATION RECORD (PFOR) A-3
Forward Segment Liner Pattern (Data Collection Only)

Motor No.: 25RM 28A Side: Left (A) Date: 3-18-93

Assessment Engineer(s)/Inspector(s): Scott Spencer

Sketch Forward Segment Liner Pattern Observations Below:



Clarification Form(s)? Yes ☒ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) A-4
Forward Center Segment Liner Pattern (Data Collection Only)

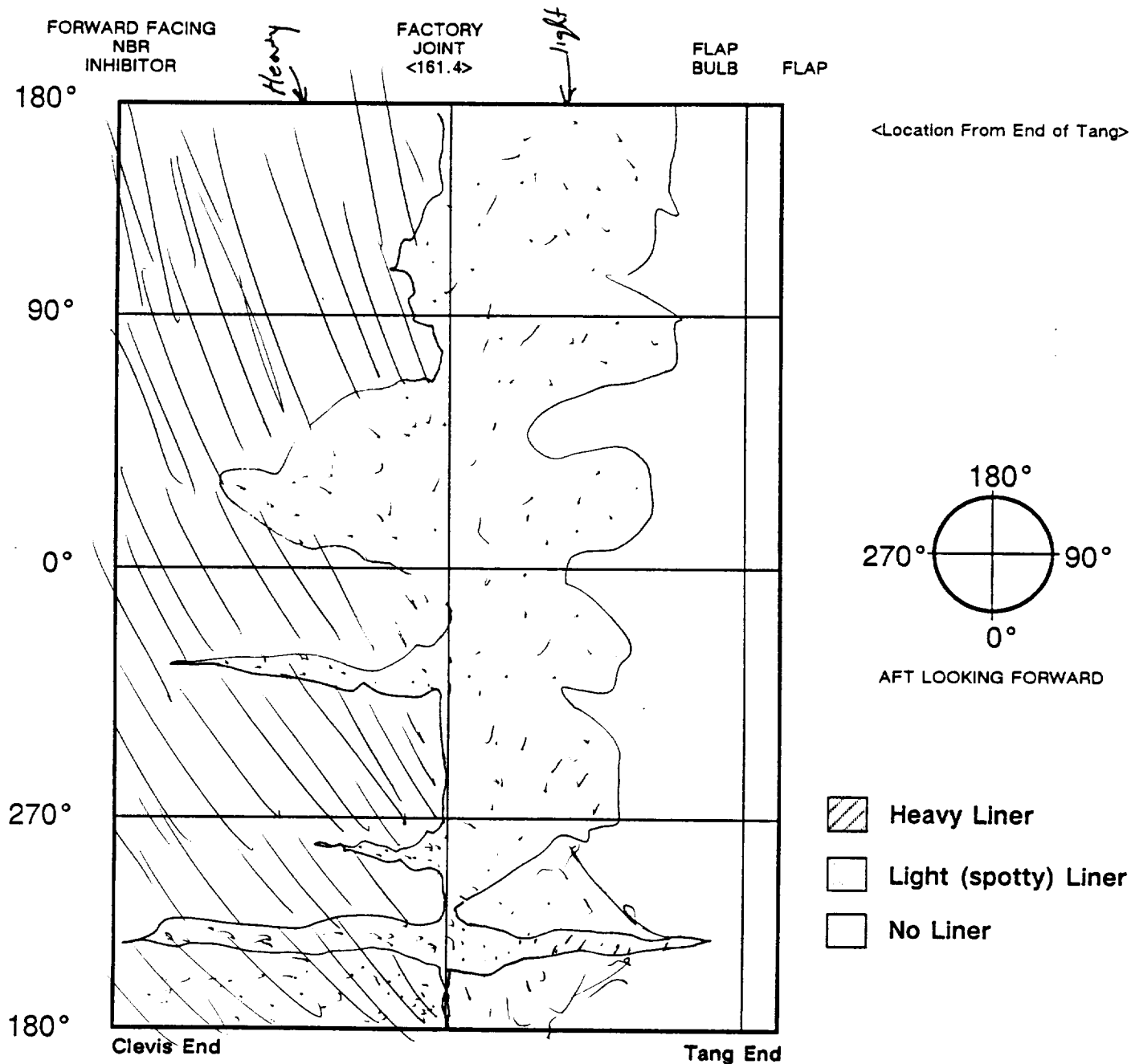
Motor No.: 360T028

Side: LEFT (A)

Date: 6-15-93

Assessment Engineer(s)/Inspector(s): *Thalman*

Sketch Forward Center Segment Liner Pattern Observations Below:



Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s): _____

REVISION _____

DOC NO. TWR-64216
SEC

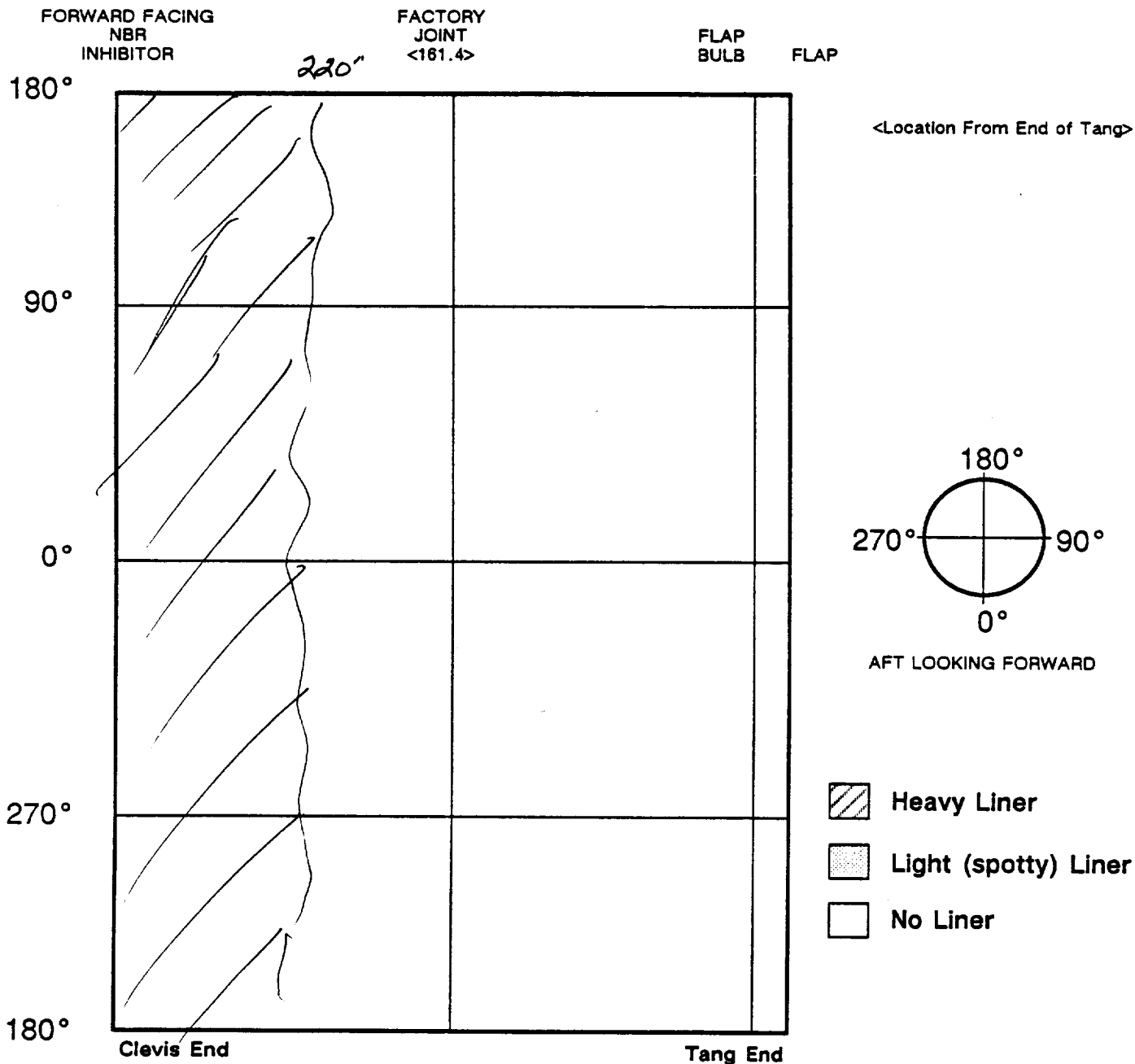
VOL
PAGE A-7

POSTFLIGHT OBSERVATION RECORD (PFOR) A-5
Aft Center Segment Liner Pattern (Data Collection Only)

Motor No.: 360T028 Side: LEFT (A) Date: 6-18-93

Assessment Engineer(s)/Inspector(s): Thalman

Sketch Aft Center Segment Liner Pattern Observations Below:



Clarification Form(s)? Yes No Clarification Form Page No.(s): _____

REVISION _____

DOC NO. TWR-64216 VOL
SEC PAGE A-8

POSTFLIGHT OBSERVATION RECORD (PFOR) A-6
Aft Segment Liner Pattern (Data Collection Only)

Motor No.: 360T028	Side: LEFT(A)	Date: 03-03-93		
Assessment Engineer(s)/Inspector(s): <i>Cornell Johnson</i>				
Sketch Aft Segment Liner Pattern Observations Below:				
FORWARD FACING NBR INHIBITOR	FACTORY JOINT <88.4>	FACTORY JOINT <208.4>	FACTORY JOINT <328.5>	AFT FACE OF AFT DOME

180°

90°

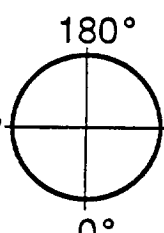
0°

270°

180°

180°	180°	180°	180°	180°
90°	90°	90°	90°	90°
0°	0°	0°	0°	0°
270°	270°	270°	270°	270°
180°	180°	180°	180°	180°

<Location From End of Clevis>



180°

270° 90°

0°

AFT LOOKING FORWARD

Heavy Liner
 Light (spotty) Liner
 No Liner

Clevis End

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): _____

REVISION _____

DOC NO. TWR-64216	VOL	
SEC	PAGE A-9	

POSTFLIGHT OBSERVATION RECORD (PFOR) A-8
Igniter Nozzle Insert Throat Diameter Measurements (Data Collection Only)

Motor No.: 360T028	Side: Left (A)	Date: 2-23-93								
Assessment Engineer(s)/Inspector(s): C Johnson										
<p>Record the Igniter Nozzle Insert Throat Diameter Measurements Below:</p> <table style="margin-left: auto; margin-right: auto;"><thead><tr><th style="text-align: center;">Degree Location</th><th style="text-align: center;">Diameter Measurement (inches)</th></tr></thead><tbody><tr><td style="text-align: center;">0</td><td style="text-align: center;"><u>6.350</u></td></tr><tr><td style="text-align: center;">60</td><td style="text-align: center;"><u>6.360</u></td></tr><tr><td style="text-align: center;">120</td><td style="text-align: center;"><u>6.390</u></td></tr></tbody></table>			Degree Location	Diameter Measurement (inches)	0	<u>6.350</u>	60	<u>6.360</u>	120	<u>6.390</u>
Degree Location	Diameter Measurement (inches)									
0	<u>6.350</u>									
60	<u>6.360</u>									
120	<u>6.390</u>									
Notes / Comments										

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No. (s): _____

REVISION _____

DOC NO. TWR-64216	VOL _____
SEC _____	PAGE A-10

POSTFLIGHT OBSERVATION RECORD (PFOR) A-9
Stiffener Ring Condition

Motor No.: 360T028	Side: Left (A)	Date: 9-1-93															
Assessment Engineer(s)/Inspector(s): RED MACKLEY																	
Ring: Forward Stiffener Ring <input checked="" type="checkbox"/> 90-210 degree section <input checked="" type="checkbox"/> 210-330 degree section <input checked="" type="checkbox"/> 330-0-90 degree section	Center Stiffener Ring <input checked="" type="checkbox"/> 90-210 degree section <input checked="" type="checkbox"/> 210-330 degree section <input checked="" type="checkbox"/> 330-0-90 degree section	Aft Stiffener Ring <input checked="" type="checkbox"/> 90-210 degree section <input checked="" type="checkbox"/> 210-330 degree section <input checked="" type="checkbox"/> 330-0-90 degree section															
Stiffener Ring Observations: <table style="width:100%; border: none;"> <tr> <td style="width:60%;"></td> <td style="width:10%; text-align: center;">Yes</td> <td style="width:10%; text-align: center;">No</td> <td style="width:20%; text-align: center;">Comment #</td> </tr> <tr> <td>A. Heavy Corrosion?</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;">①</td> </tr> </table>				Yes	No	Comment #	A. Heavy Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	①							
	Yes	No	Comment #														
A. Heavy Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	①														
Notes / Comments Special Issue 3.1.2.1: ① No corrosion was noted on the stiffener ring Chemloked regions. ② 5 of 9 stiffener rings were inspected at Clearfield H-7. The remaining had not yet been water blasted. The following rings were inspected: <table style="width:100%; border: none;"> <tr> <td style="width:30%;">P/N 1U52502-08</td> <td style="width:20%;">S/N 38</td> <td style="width:10%;">#1</td> </tr> <tr> <td>-04</td> <td>90</td> <td>#1</td> </tr> <tr> <td>-08</td> <td>43</td> <td>#3</td> </tr> <tr> <td>-08</td> <td>89</td> <td>#2</td> </tr> <tr> <td>-07</td> <td>89</td> <td>#1</td> </tr> </table>			P/N 1U52502-08	S/N 38	#1	-04	90	#1	-08	43	#3	-08	89	#2	-07	89	#1
P/N 1U52502-08	S/N 38	#1															
-04	90	#1															
-08	43	#3															
-08	89	#2															
-07	89	#1															
Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Preliminary PFAR Number(s): N/A																	
Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Clarification Form Page No.(s):																	

POSTFLIGHT OBSERVATION RECORD (PFOR) A-1
Postfire Insulation Common Planning Index (CPI) Log Numbers

Motor No.: 360T028	Side: Right (B)	Date: 21 JULY 1993		
Assessment Engineer(s)/Inspector(s): NORM EDDY				
<u>Record CPI Log and Postfire Part and Serial Numbers Below:</u>				
	P/N	PPC No.	Serial No.	CPI Log No.
A. Igniter Chamber	N/A	N/A	N/A	N/A
B. Igniter Adapter	<u>1U77457-01</u>	<u>903</u>	<u>10</u>	<u>4CIBH</u>
Notes / Comments				

Clarification Form(s)? ☐ Yes ☐ No Clarification Form Page No. (s): _____

REVISION _____

DOC NO. TWR-64216	VOL
SEC	PAGE A-12

POSTFLIGHT OBSERVATION RECORD (PFOR) A-2
Segment Internal Insulation Condition (After Low Pressure Rinse)

Motor No.: 360T028	Side: Right (B)	Date: 21 JULY 1993																								
Assessment Engineer(s)/Inspector(s): NORM EDDY																										
Segment: Forward																										
Segment Internal Insulation Observations:																										
A. Abnormal Erosion? B. Gas Paths? C. Ply Separations? D. Abnormal Blisters? E. Abnormal Cuts or Gouges? F. Foreign Material Within Insulation? G. Non-Uniformities in the Eleven Point Burn-out Pattern? (Forward Segment Only)	N/A	<table style="width: 100%; border-collapse: collapse;"><thead><tr><th style="width: 33%;">Yes</th><th style="width: 33%;">No</th><th style="width: 34%;">Comment #</th></tr></thead><tbody><tr><td><input checked="" type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr></tbody></table>	Yes	No	Comment #	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Yes	No	Comment #																								
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																								
Notes / Comments <div style="font-size: 1.2em; margin-top: 10px;">RH SEGMENTS WASHED OUT DUE TO REDUCED POSTFLIGHT INSPECTION PLAN.</div>																										
<div style="display: flex; justify-content: space-between;"><div>Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</div><div>Preliminary PFAR Number(s): _____</div></div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div>Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</div><div>Clarification Form Page No.(s): _____</div></div>																										

POSTFLIGHT OBSERVATION RECORD (PFOR) A-2
Segment Internal Insulation Condition (After Low Pressure Rinse)

Motor No.: 360T028	Side: Right (B)	Date: 21 JULY 1993
Assessment Engineer(s)/Inspector(s): NORM EDDY		
Segment: Forward Center		
Segment Internal Insulation Observations:		
	Yes	No
A. Abnormal Erosion?	/	/
B. Gas Paths?	/	/
C. Ply Separations?	/	/
D. Abnormal Blisters?	/	/
E. Abnormal Cuts or Gouges?	/	/
F. Foreign Material Within Insulation?	/	/
G. Liner Completely Missing? (Center Segments Only)	/	/

Notes / Comments

N/A

RH SEGMENTS WASHED OUT DUE TO
REDUCED POSTFLIGHT INSPECTION PLAN.

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) A-2
Segment Internal Insulation Condition (After Low Pressure Rinse)

Motor No.: 360T028	Side: Right (B)	Date: 21 JULY 1993
Assessment Engineer(s)/Inspector(s): NORM EDDY		
Segment: Aft Center		
Segment Internal Insulation Observations:		
A. Abnormal Erosion?	Yes	No
B. Gas Paths?	Yes	No
C. Ply Separations?	Yes	No
D. Abnormal Blisters?	Yes	No
E. Abnormal Cuts or Gouges?	Yes	No
F. Foreign Material Within Insulation?	Yes	No
G. Liner Completely Missing? (Center Segments Only)	Yes	No

Notes / Comments

RH SEGMENTS WASHED OUT DUE TO
REDUCED POSTFLIGHT INSPECTION PLAN.

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) A-2
Segment Internal Insulation Condition (After Low Pressure Rinse)

Motor No.: 360T028	Side: Right (B)	Date:																																
Assessment Engineer(s)/Inspector(s):																																		
Segment: Aft																																		
<table border="0" style="width:100%;"> <tr> <td style="width:60%;"><u>Segment Internal Insulation Observations:</u></td> <td style="width:10%; text-align: center;">Yes</td> <td style="width:10%; text-align: center;">No</td> <td style="width:20%; text-align: center;">Comment #</td> </tr> <tr> <td>A. Abnormal Erosion?</td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> </tr> <tr> <td>B. Gas Paths?</td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> </tr> <tr> <td>C. Ply Separations?</td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> </tr> <tr> <td>D. Abnormal Blisters?</td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> </tr> <tr> <td>E. Abnormal Cuts or Gouges?</td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> </tr> <tr> <td>F. Foreign Material Within Insulation?</td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> </tr> <tr> <td>G. NBR Under the CF/EPDM Exposed in the Aft Dome?</td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> <td align="center"><input checked="" type="checkbox"/></td> </tr> </table>			<u>Segment Internal Insulation Observations:</u>	Yes	No	Comment #	A. Abnormal Erosion?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	B. Gas Paths?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	C. Ply Separations?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	D. Abnormal Blisters?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	E. Abnormal Cuts or Gouges?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	F. Foreign Material Within Insulation?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	G. NBR Under the CF/EPDM Exposed in the Aft Dome?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<u>Segment Internal Insulation Observations:</u>	Yes	No	Comment #																															
A. Abnormal Erosion?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>																															
B. Gas Paths?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>																															
C. Ply Separations?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>																															
D. Abnormal Blisters?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>																															
E. Abnormal Cuts or Gouges?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>																															
F. Foreign Material Within Insulation?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>																															
G. NBR Under the CF/EPDM Exposed in the Aft Dome?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>																															
<table border="0" style="width:100%;"> <tr> <td style="width:20%;">Notes / Comments</td> <td> <div style="font-size: 2em; font-family: cursive;">N/A</div> <div style="font-size: 1.2em;">RH SEGMENTS WASHED OUT DUE TO REDUCED POSTFLIGHT INSPECTION PLAN.</div> </td> </tr> </table>				Notes / Comments	<div style="font-size: 2em; font-family: cursive;">N/A</div> <div style="font-size: 1.2em;">RH SEGMENTS WASHED OUT DUE TO REDUCED POSTFLIGHT INSPECTION PLAN.</div>																													
Notes / Comments	<div style="font-size: 2em; font-family: cursive;">N/A</div> <div style="font-size: 1.2em;">RH SEGMENTS WASHED OUT DUE TO REDUCED POSTFLIGHT INSPECTION PLAN.</div>																																	
<table border="0" style="width:100%;"> <tr> <td style="width:50%;"> Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No </td> <td style="width:50%;"> Preliminary PFAR Number(s): _____ </td> </tr> <tr> <td> Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No </td> <td> Clarification Form Page No.(s): _____ </td> </tr> </table>				Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Preliminary PFAR Number(s): _____	Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Clarification Form Page No.(s): _____																											
Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Preliminary PFAR Number(s): _____																																	
Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Clarification Form Page No.(s): _____																																	

POSTFLIGHT OBSERVATION RECORD (PFOR) A-8
Igniter Nozzle Insert Throat Diameter Measurements (Data Collection Only)

Motor No.: 360T028

Side: Right (B)

Date: 2-23-93

Assessment Engineer(s)/Inspector(s): C. Johnson

Record the Igniter Nozzle Insert Throat Diameter Measurements Below:

Degree Location	Diameter Measurement (inches)
0	<u>6.311</u>
60	<u>6.318</u>
120	<u>6.305</u>

Notes / Comments

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s): _____

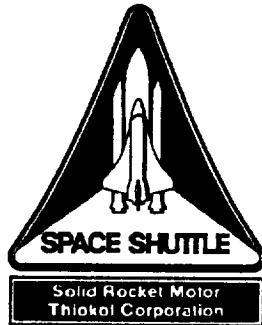
REVISION _____

DOC NO. TWR-64216
SEC _____

VOL _____
PAGE A-17

POSTFLIGHT OBSERVATION RECORD (PFOR) A-9
Stiffener Ring Condition

Motor No.: 360T028	Side: Right (B)	Date: 9-1-93																		
Assessment Engineer(s)/Inspector(s): RED MACKLEY																				
Ring: Forward Stiffener Ring <input checked="" type="checkbox"/> 90-210 degree section <input checked="" type="checkbox"/> 210-330 degree section <input checked="" type="checkbox"/> 330-0-90 degree section	Center Stiffener Ring <input checked="" type="checkbox"/> 90-210 degree section <input checked="" type="checkbox"/> 210-330 degree section <input checked="" type="checkbox"/> 330-0-90 degree section	Aft Stiffener Ring <input checked="" type="checkbox"/> 90-210 degree section <input checked="" type="checkbox"/> 210-330 degree section <input checked="" type="checkbox"/> 330-0-90 degree section																		
Stiffener Ring Observations: A. Heavy Corrosion?		Yes _____ No <input checked="" type="checkbox"/> Comment # ①																		
Notes / Comments Special Issue 3.1.2.1: ① No corrosion was noted on the stiffener ring Chemlocked regions. ② 6 of 9 stiffener rings were inspected at Clearfield H-7. The remaining had not yet been water blasted. The following rings were inspected: <table style="width:100%; border: none;"> <tr> <td style="width:33%;">P/N 1452502-08</td> <td style="width:33%;">S/N 94</td> <td style="width:33%;">#3</td> </tr> <tr> <td>-08</td> <td>95</td> <td>#1</td> </tr> <tr> <td>-04</td> <td>101</td> <td>#1</td> </tr> <tr> <td>-08</td> <td>97</td> <td>#2</td> </tr> <tr> <td>-07</td> <td>12</td> <td>#3</td> </tr> <tr> <td>-07</td> <td>95</td> <td>#2</td> </tr> </table>			P/N 1452502-08	S/N 94	#3	-08	95	#1	-04	101	#1	-08	97	#2	-07	12	#3	-07	95	#2
P/N 1452502-08	S/N 94	#3																		
-08	95	#1																		
-04	101	#1																		
-08	97	#2																		
-07	12	#3																		
-07	95	#2																		
Preliminary PFAR(s)? _____ Yes _____ No <input checked="" type="checkbox"/>		Preliminary PFAR Number(s): N/A																		
Clarification Form(s)? _____ Yes _____ No <input checked="" type="checkbox"/>		Clarification Form Page No.(s): _____																		



Appendix B Case, Seals, and Joints PFORs

Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

November 1993

Prepared for:

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812**

Contract No. NAS8-38100

DR No. 4-23

WBS No. 4C601-04-01

ECS No. SS4771

***Thiokol* CORPORATION
SPACE OPERATIONS**

P.O. Box 707, Brigham City, Utah 84302-0707 (801) 863-3511

CASE, SEALS, AND JOINTS REQUIRED PFOR LIST

<u>PFOR #</u>	<u>Title</u>	<u>Side</u>	<u>Joint or Location</u>	<u>Final Report Page Number</u>
B-2	S&A Device (Barrier-Booster and Environmental Seal Region) Condition	Left	S&A	B-1
B-7	S&A Rotor Shaft O-ring Condition (Detailed)	Left	S&A	B-2
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	S&A 126°	B-3
B-4	Leak Check Plug/SII Condition (Detailed)	Left	S&A 126°	B-4
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	S&A 126°	B-5
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	18° SII	B-6
B-4	Leak Check Plug/SII Condition (Detailed)	Left	18° SII	B-7
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	18° SII	B-8
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	198° SII	B-9
B-4	Leak Check Plug/SII Condition (Detailed)	Left	198° SII	B-10
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	198° SII	B-11

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

CASE, SEALS, AND JOINTS REQUIRED LIST (Cont.)

<u>PFOR #</u>	<u>Title</u>	<u>Side</u>	<u>Joint or Location</u>	<u>Final Report Page Number</u>
B-3	Internal Nozzle Joint Condition	Left	Nozzle Joint #2	B-12
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Left	Nozzle Joint #2	B-13
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	Nozzle Joint #2	B-14
B-4	Leak Check Plug/SII Condition (Detailed)	Left	Nozzle Joint #2	B-15
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	Nozzle Joint #2	B-16
B-3	Internal Nozzle Joint Condition	Left	Nozzle Joint #3	B-17
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Left	Nozzle Joint #3	B-18
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	Nozzle Joint #3	B-19
B-4	Leak Check Plug/SII Condition (Detailed)	Left	Nozzle Joint #3	B-20
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	Nozzle Joint #3	B-21
B-3	Internal Nozzle Joint Condition	Left	Nozzle Joint #4	B-22
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Left	Nozzle Joint #4	B-23
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	Nozzle Joint #4	B-24
B-4	Leak Check Plug/SII Condition (Detailed)	Left	Nozzle Joint #4	B-25
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	Nozzle Joint #4	B-26

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

CASE, SEALS, AND JOINTS REQUIRED LIST (Cont.)

<u>PFOR #</u>	<u>Title</u>	<u>Side</u>	<u>Joint or Location</u>	<u>Final Report Page Number</u>
B-3	Internal Nozzle Joint Condition	Left	Nozzle Joint #5	B-27
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Left	Nozzle Joint #5	B-28
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	Nozzle Joint #5	B-29
B-4	Leak Check Plug/SII Condition (Detailed)	Left	Nozzle Joint #5	B-30
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	Nozzle Joint #5	B-31
B-8	Packing With Retainer Condition (Detailed)	Left	Nozzle Fixed Housing	B-32
B-9	Case Factory Joint Condition	Left	Forward Dome	B-33
B-9	Case Factory Joint Condition	Left	Forward	B-34
B-9	Case Factory Joint Condition	Left	Forward Center	B-35
B-9	Case Factory Joint Condition	Left	Aft Center	B-36
B-9	Case Factory Joint Condition	Left	ET Attach/Stiffener	B-37
B-9	Case Factory Joint Condition	Left	Stiffener/Stiffener	B-38
B-9	Case Factory Joint Condition	Left	Aft Dome	B-39
B-10	Case Y-Joint Condition	Left	Forward Dome	B-40
B-10	Case Y-Joint Condition	Left	Aft Dome	B-41

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

CASE, SEALS, AND JOINTS REQUIRED LIST (Cont.)

<u>PFOR #</u>	<u>Title</u>	<u>Side</u>	<u>Joint or Location</u>	<u>Final Report Page Number</u>
B-2	S&A Device (Barrier-Booster and Environmental Seal Region) Condition	Right	S&A	B-42
B-7	S&A Rotor Shaft O-ring Condition (Detailed)	Right	S&A	B-43
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	S&A 126°	B-44
B-4	Leak Check Plug/SII Condition (Detailed)	Right	S&A 126°	B-45
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	S&A 126°	B-46
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	18° SII	B-47
B-4	Leak Check Plug/SII Condition (Detailed)	Right	18° SII	B-48
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	18° SII	B-49
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	198° SII	B-50
B-4	Leak Check Plug/SII Condition (Detailed)	Right	198° SII	B-51
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	198° SII	B-52

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

CASE, SEALS, AND JOINTS REQUIRED LIST (Cont.)

<u>PFOR #</u>	<u>Title</u>	<u>Side</u>	<u>Joint or Location</u>	<u>Final Report Page Number</u>
B-3	Internal Nozzle Joint Condition	Right	Nozzle Joint #2	B-53
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Right	Nozzle Joint #2	B-54
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	Nozzle Joint #2	B-55
B-4	Leak Check Plug/SII Condition (Detailed)	Right	Nozzle Joint #2	B-56
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	Nozzle Joint #2	B-57
B-3	Internal Nozzle Joint Condition	Right	Nozzle Joint #3	B-58
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Right	Nozzle Joint #3	B-59
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	Nozzle Joint #3	B-60
B-4	Leak Check Plug/SII Condition (Detailed)	Right	Nozzle Joint #3	B-61
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	Nozzle Joint #3	B-62
B-3	Internal Nozzle Joint Condition	Right	Nozzle Joint #4	B-63
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Right	Nozzle Joint #4	B-64
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	Nozzle Joint #4	B-65
B-4	Leak Check Plug/SII Condition (Detailed)	Right	Nozzle Joint #4	B-66
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	Nozzle Joint #4	B-67

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

CASE, SEALS, AND JOINTS REQUIRED LIST (Cont.)

<u>PFOR #</u>	<u>Title</u>	<u>Side</u>	<u>Joint or Location</u>	<u>Final Report Page Number</u>
B-3	Internal Nozzle Joint Condition	Right	Nozzle Joint #5	B-68
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Right	Nozzle Joint #5	B-69
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	Nozzle Joint #5	B-70
B-4	Leak Check Plug/SII Condition (Detailed)	Right	Nozzle Joint #5	B-71
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	Nozzle Joint #5	B-72
B-8	Packing With Retainer Condition (Detailed)	Right	Nozzle Fixed Housing	B-73
B-9	Case Factory Joint Condition	Right	Forward Dome	B-74
B-9	Case Factory Joint Condition	Right	Forward	B-75
B-9	Case Factory Joint Condition	Right	Forward Center	B-76
B-9	Case Factory Joint Condition	Right	Aft Center	B-77
B-9	Case Factory Joint Condition	Right	ET Attach/ Stiffener	B-78
B-9	Case Factory Joint Condition	Right	Stiffener/ Stiffener	B-79
B-9	Case Factory Joint Condition	Right	Aft Dome	B-80
B-10	Case Y-Joint Condition	Right	Forward Dome	B-81
B-10	Case Y-Joint Condition	Right	Aft Dome	B-82

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

POSTFLIGHT OBSERVATION RECORD (PFOR) B-2
S&A Device (Barrier-Booster and Environmental Seal Regions) Condition

Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): G. Hyer, D. Garecht, M. Lynn, D. Bullard, C. Taylor, J. Edwards		

<u>Barrier-Booster Bore and Rotor Observations:</u>	Yes	No	Comment #
A. Heat Affected or Eroded O-ring (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Soot To or Past O-rings?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Metal Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Excessive or No Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I. Teflon Retainer Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

<u>Environmental Seal Region Observations:</u>	Yes	No	Comment #
J. Environmental O-ring Assembly Damage (Visible Without Magnification)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-7
S&A Rotor Shaft O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): G. Hyer, D. Garrecht, M. Lynn, D. Bullard, C. Taylor, J. B.		
Location: S&A Device Barrier-Booster Rotor Shaft		
<u>Forward Primary O-ring Observations:</u>	Yes	No
A. Heat Affected or Eroded O-ring?	_____	✓ _____
B. O-ring Defects/Damage?	_____	✓ _____
<u>Aft Primary O-ring Observations:</u>		
C. Heat Affected or Eroded O-ring?	_____	✓ _____
D. O-ring Defects/Damage?	_____	✓ _____
<u>Forward Secondary O-ring Observations:</u>		
E. Heat Affected or Eroded O-ring?	_____	✓ _____
F. O-ring Defects/Damage?	_____	✓ _____
<u>Aft Secondary O-ring Observations:</u>		
G. Heat Affected or Eroded O-ring?	_____	✓ _____
H. O-ring Defects/Damage?	_____	✓ _____

Notes / Comments

Preliminary PFAR(s)? _____ Yes _____ No ✓

Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes _____ No ✓

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): G. Hyer, D. Garecht, M. Lyon, D. Ballard, C. Taylor, J. Richardson		
Location: 126-Degree Barrier-Booster Bore		

Leak Check Plug Observations:

	Yes	No	Comment #
A. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Soot To or Past O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Heat Affected or Eroded O-ring (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Excessive or No Grease on O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Excessive Grease on Plug?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I. Thread Damage (Visible at Removal)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Leak Check Port Observations:

J. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
L. Excessive Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
N. Metal Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
O. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
P. Obstructed Through Hole?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4
Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): G. Hyer, Diane Garecht, M. Lyon, D. Burkard, C. Taylor		
Location: 126-Degree Barrier-Booster Bore J. Richards		

Leak Check Plug Observations:

- A. Foreign Material Between the O-ring and Plug?
- B. Heat Affected Metal?
- C. Seal Surface/Thread Damage?

Yes

No

Comment #

_____	✓	_____
_____	✓	_____
_____	✓	_____

Notes / Comments

Preliminary PFAR(s)? _____ Yes _____ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes _____ No

Clarification Form Page No. (s): _____

REVISION _____

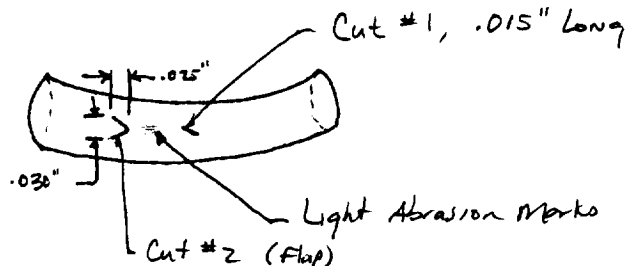
POSTFLIGHT OBSERVATION RECORD (PFOR) B-6
Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): G. Hyer, D. Barecht, M. Lyon, D. Bullard, C. Taylor, J. Richards		
Location: 126-Degree Barrier-Booster Bore		

Secondary O-ring Observations:	Yes	No	Comment #
A. Heat Affected or Eroded O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. O-ring Defects/Damage?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1

Notes / Comments

#1.) Two cuts observed on O-ring O.D. See sketch below for approximate measurements and clarifications.



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Preliminary PFAR(s)? ☒ Yes ☐ No

Preliminary PFAR Number(s): 53C-09

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): G. Hyer, D. Garecht, M. Lyon, D. Bulard, C. Taylor		
Location: 18-Degree SII J. Richards		

SII Observations:

	Yes	No	Comment #
A. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Soot To or Past O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Heat Affected or Eroded O-ring (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Excessive or No Grease on O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Excessive Grease on SII?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I. Thread Damage (Visible at Removal)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

SII Port Observations:

J. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
L. Excessive Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
N. Metal Damage?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
O. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
P. Obstructed Leak Check Through Hole?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

1.) Typical galling on Land between - Primary and Secondary Seal Surface. galling is due to Sealing Washer weld

Preliminary PFAR(s)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Preliminary PFAR Number(s): _____
Clarification Form(s)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4
Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 21 Dec 1992
Assessment Engineer(s)/Inspector(s): <u>B. Hyer, D. Garecht, M. Lyon, D. Bullock, C. Taylor</u>		
Location: 18-Degree SII J. Richards		
SII Observations:		
	Yes	No
A. Foreign Material Between the O-ring and SII?	_____	✓ _____
B. Heat Affected Metal?	_____	✓ _____
C. Seal Surface/Thread Damage?	_____	✓ _____
Notes / Comments		

Preliminary PFAR(s)? Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? Yes ☒ No Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6
Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92	
Assessment Engineer(s)/Inspector(s): G. Hyer, D. Garecht, M. Lyon, D. Bulford, Co Taylor			
Location: 18-Degree SII		J. Richards	
<u>Primary O-ring Observations:</u>	Yes	No	Comment #
A. Heat Affected or Eroded O-ring?	_____	<input checked="" type="checkbox"/>	_____
B. O-ring Defects/Damage?	_____	<input checked="" type="checkbox"/>	_____
<u>Secondary O-ring Observations:</u>			
C. Heat Affected or Eroded O-ring?	_____	<input checked="" type="checkbox"/>	_____
D. O-ring Defects/Damage?	_____	<input checked="" type="checkbox"/>	_____

Notes / Comments

Preliminary PFAR(s)? _____ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes ☒ No

Clarification Form Page No.(s): _____

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): G. Hyer, D. Barecht, M. Lyon, D. Bullard, C. Taylor		
Location: 198-Degree SII J. Richardson		

SII Observations:

- A. Sooted Metal Surfaces?
- B. Soot To or Past O-ring?
- C. Foreign Material?
- D. O-ring Damage (In Groove)?
- E. Heat Affected or Eroded O-ring (In Groove)?
- F. Excessive or No Grease on O-ring?
- G. Excessive Grease on SII?
- H. Corrosion?
- I. Thread Damage (Visible at Removal)?

Yes	No	Comment #
_____	✓	_____
_____	✓	_____
_____	✓	_____
_____	✓	_____
_____	✓	_____
_____	✓	_____
_____	✓	_____
_____	✓	_____
_____	✓	_____

SII Port Observations:

- J. Sooted Metal Surfaces?
- K. Foreign Material?
- L. Excessive Grease?
- M. Corrosion?
- N. Metal Damage?
- O. Heat Affected Metal?
- P. Obstructed Leak Check Through Hole?

_____	✓	_____
_____	✓	_____
_____	✓	_____
_____	✓	_____
✓	_____	1
_____	✓	_____
_____	✓	_____

Notes / Comments

on the land

1.) typical galling observed between the primary and Secondary Sealing Surface, galling is due to Washer weld

Preliminary PFAR(s)? _____ Yes ☒ No ☐ **Preliminary PFAR Number(s):** _____

Clarification Form(s)? _____ Yes ☒ No ☐ **Clarification Form Page No.(s):** _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6
Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92	
Assessment Engineer(s)/Inspector(s): <u>B. Hye, D. Barecht, M. Lyon, D. Bulard, C. Taylor, J. Kichard</u>			
Location: 198-Degree SII			
Primary O-ring Observations:			
A. Heat Affected or Eroded O-ring?	Yes _____	No _____/_____ _____	Comment # _____
B. O-ring Defects/Damage?	_____	_____/_____ _____	_____
Secondary O-ring Observations:			
C. Heat Affected or Eroded O-ring?	_____	_____/_____ _____	_____
D. O-ring Defects/Damage?	_____	_____/_____ _____	_____
Notes / Comments			

Preliminary PFAR(s)? _____ Yes _____ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes _____ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-3
Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): D. Garecht, M. Nolan		
Joint: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)		

Internal Nozzle Joint Observations:	Yes	No	Comment #
A. Soot To or Past O-rings?	✓		①
B. Heat Affected Metal?		✓	
C. Foreign Material?		✓	
D. RTV in Contact With or Past the Primary O-ring?		✓	
E. O-ring Damage (In Groove)?		✓	
F. Heat Affected or Eroded O-rings (In Groove)?		✓	
G. Excessive or No Grease?		✓	
H. Corrosion?	✓		②
I. Metal Damage?	✓		③

Notes / Comments

- ① Soot to bolt hole circle 0°-360° and to primary intermittent full circumference.
- ② Intermittent light corrosion full circumference
- ③ One burnish mark (caused by disassembly) was noted on the nose inlet housing secondary seal surface.

Preliminary PFAR(s)? ☐ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-5
Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): <u>D. Garecht, M. Nolan</u>		
Joint: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)		
Primary O-ring Observations:		
A. Heat Affected or Eroded O-ring?	Yes _____	No <u>✓</u> _____
B. O-ring Damage/Defects?	_____	<u>✓</u> _____
Secondary O-ring Observations:		
A. Heat Affected or Eroded O-ring?	_____	<u>✓</u> _____
B. O-ring Damage/Defects?	_____	<u>✓</u> _____
Notes / Comments		

Preliminary PFAR(s)? _____ Yes ✓ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes ✓ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Left (A)	Date: 12/15/92	
Assessment Engineer(s)/Inspector(s): D. Garecht, M. Nolan			
Location: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)			
<u>Leak Check Plug Observations:</u>	Yes	No	Comment #
A. Sooted Metal Surfaces?	_____	✓ _____	_____
B. Soot To or Past O-ring?	_____	✓ _____	_____
C. Foreign Material?	_____	✓ _____	_____
D. O-ring Damage (In Groove)?	_____	✓ _____	_____
E. Heat Affected or Eroded O-ring (In Groove)?	_____	✓ _____	_____
F. Excessive or No Grease on O-ring?	_____	✓ _____	_____
G. Excessive Grease on Plug?	_____	✓ _____	_____
H. Corrosion?	_____	✓ _____	_____
I. Thread Damage (Visible at Removal)?	_____	✓ _____	_____
<u>Leak Check Port Observations:</u>			
J. Sooted Metal Surfaces?	_____	✓ _____	_____
K. Foreign Material?	_____	✓ _____	_____
L. Excessive Grease?	_____	✓ _____	_____
M. Corrosion?	_____	✓ _____	_____
N. Metal Damage?	_____	✓ _____	_____
O. Heat Affected Metal?	_____	✓ _____	_____
P. Obstructed Through Hole?	_____	✓ _____	_____

Notes / Comments

Breakaway .32 in. lb
Running .07 in. lb

Preliminary PFAR(s)? _____ Yes ☒ No _____ Preliminary PFAR Number(s): _____
Clarification Form(s)? _____ Yes ☒ No _____ Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4
Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): <u>D. Garecht, M. Nolan</u>		
Location: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)		
Leak Check Plug Observations:		
	Yes	No
A. Foreign Material Between the O-ring and Plug?	_____	_____ ✓
B. Heat Affected Metal?	_____	_____ ✓
C. Seal Surface/Thread Damage?	_____	_____ ✓
Notes / Comments		

Preliminary PFAR(s)? _____ Yes ✓ No Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes ✓ No Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6
Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): D. Garecht, M. Nolan		
Location: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)		
Secondary O-ring Observations:	Yes	No
A. Heat Affected or Eroded O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. O-ring Defects/Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Comment #		

Notes / Comments

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No. (s): _____

REVISION _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-3
Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 12-16-92
Assessment Engineer(s)/Inspector(s): <i>Diane Garecht, Mike Nolan</i>		
Joint: Nose Inlet-to-Throat (Joint #3)		
Internal Nozzle Joint Observations:	Yes	No
A. Soot To or Past O-rings?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
D. RTV in Contact With or Past the Primary O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
E. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
F. Heat Affected or Eroded O-rings (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
G. Excessive or No Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
H. Corrosion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
I. Metal Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Notes / Comments

① Light / medium corrosion, intermittent full circumference

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-5
Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12/16/92
Assessment Engineer(s)/Inspector(s): D. Gorescht, M. Nolan		
Joint: Nose Inlet-to-Throat (Joint #3)		
Primary O-ring Observations:		
A. Heat Affected or Eroded O-ring?	Yes _____	No _____/_____ ✓
B. O-ring Damage/Defects?	_____	_____/_____ ✓
Secondary O-ring Observations:		
A. Heat Affected or Eroded O-ring?	_____	_____/_____ ✓
B. O-ring Damage/Defects?	_____	_____/_____ ✓
Notes / Comments		
Preliminary PFAR(s)? _____ Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Preliminary PFAR Number(s): _____		
Clarification Form(s)? _____ Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
Clarification Form Page No. (s): _____		

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Left (A)	Date: 12-16-92
Assessment Engineer(s)/Inspector(s): <i>Diane Garecht</i>		
Location: Nose Inlet-to-Throat (Joint #3)		

Leak Check Plug Observations:

	Yes	No	Comment #
A. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Soot To or Past O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Heat Affected or Eroded O-ring (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Excessive or No Grease on O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Excessive Grease on Plug?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I. Thread Damage (Visible at Removal)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Leak Check Port Observations:

J. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
L. Excessive Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
N. Metal Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
O. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
P. Obstructed Through Hole?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

Breakaway: 40 in. lb
Running: 10 in. lb

Preliminary PFAR(s)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Preliminary PFAR Number(s):
Clarification Form(s)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4
Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12-16-92
Assessment Engineer(s)/Inspector(s): Diane Garet, Mike Nolan		
Location: Nose Inlet-to-Throat (Joint #3)		
Leak Check Plug Observations:	Yes	No
A. Foreign Material Between the O-ring and Plug?	_____	_____ <input checked="" type="checkbox"/>
B. Heat Affected Metal?	_____	_____ <input checked="" type="checkbox"/>
C. Seal Surface/Thread Damage?	_____	_____ <input checked="" type="checkbox"/>

Notes / Comments

Preliminary PFAR(s)? _____ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes ☒ No

Clarification Form Page No. (s): _____

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-3
Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 12-15-97
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Marv Lyon		
Joint: Throat-to-Forward Exit Cone (Joint #4)		

Internal Nozzle Joint Observations:	Yes	No	Comment #
A. Soot To or Past O-rings?	_____	✓	_____
B. Heat Affected Metal?	_____	✓	_____
C. Foreign Material?	_____	✓	_____
D. RTV in Contact With or Past the Primary O-ring?	✓	_____	1
E. O-ring Damage (In Groove)?	_____	✓	_____
F. Heat Affected or Eroded O-rings (In Groove)?	_____	✓	_____
G. Excessive or No Grease?	_____	✓	_____
H. Corrosion?	✓	_____	2
I. Metal Damage?	_____	✓	_____

Notes / Comments

- 1) RTV reached the primary O-ring between 37.5°-165° and 247.5-347.5°
- 2) Light - to - medium corrosion observed between the primary and secondary O-rings full circumference (Throat). Nonseal surface light - to - medium corrosion observed on the forward exit cone between the phenolic and secondary O-ring footprint full circumference.

Preliminary PFAR(s)? _____ Yes _____ ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes _____ ☒ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-5
Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Marc Lyon		
Joint: Throat-to-Forward Exit Cone (Joint #4)		
Primary O-ring Observations:		
A. Heat Affected or Eroded O-ring?	Yes _____ _____	No _____ _____
B. O-ring Damage/Defects?	_____ _____	_____ _____
Secondary O-ring Observations:		
A. Heat Affected or Eroded O-ring?	_____ _____	_____ _____
B. O-ring Damage/Defects?	_____ _____	_____ _____
Notes / Comments		

Preliminary PFAR(s)? Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? Yes ☒ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Left (A)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Mark Lyon		
Location: Throat-to-Forward Exit Cone (Joint #4)		

Leak Check Plug Observations:

	Yes	No	Comment #
A. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Soot To or Past O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Heat Affected or Eroded O-ring (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Excessive or No Grease on O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Excessive Grease on Plug?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Corrosion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
I. Thread Damage (Visible at Removal)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Leak Check Port Observations:

J. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
L. Excessive Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M. Corrosion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2
N. Metal Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
O. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
P. Obstructed Through Hole?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

- 1) Light corrosion observed on the tip of the plug.
- 2) Medium corrosion observed in the bottom of the port.
Two small areas of light corrosion observed on the spotface.

Breakaway Torque 36 in-lbs.
Running Torque 10 in-lbs.

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4
Leak Check Plug/Sil Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Mark Lyon		
Location: Throat-to-Forward Exit Cone (Joint #4)		
Leak Check Plug Observations:		
	Yes	No
A. Foreign Material Between the O-ring and Plug?	_____	_____✓_____
B. Heat Affected Metal?	_____	_____✓_____
C. Seal Surface/Thread Damage?	_____	_____✓_____
Notes / Comments		

Preliminary PFAR(s)? Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? Yes ☒ No Clarification Form Page No.(s): _____

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-3
Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Mark Lyon		
Joint: Aft End Ring-to-Fixed Housing (Joint #5)		

Internal Nozzle Joint Observations:	Yes	No	Comment #
A. Soot To or Past O-rings?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. RTV In Contact With or Past the Primary O-ring?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
E. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Heat Affected or Eroded O-rings (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Excessive or No Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Corrosion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2
I. Metal Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	3

Notes / Comments

Special Issue 3.2.3.1: No anomalous conditions were observed. Grease application was nominal.

- 1) RTV reached the primary O-ring between 205° - 260° and 30° - 85°.
- 2) Medium corrosion observed on aft end ^{flange ID} ~~inner tip~~ intermittent full circumference. ~~Light corrosion observed on the fixed housing~~
- 3) Metal shavings were observed on several of the bolts. Metal shavings were found towards the end of the bolt near the nylok patch.

Preliminary PFAR(s)? ☐ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-5
Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Mark Lyon		
Joint: Aft End Ring-to-Fixed Housing (Joint #5)		
<u>Primary O-ring Observations:</u>	Yes	No
A. Heat Affected or Eroded O-ring?	_____	_____ <input checked="" type="checkbox"/>
B. O-ring Damage/Defects?	_____	_____ <input checked="" type="checkbox"/>
<u>Secondary O-ring Observations:</u>		
A. Heat Affected or Eroded O-ring?	_____	_____ <input checked="" type="checkbox"/>
B. O-ring Damage/Defects?	_____	_____ <input checked="" type="checkbox"/>
<u>Notes / Comments</u>		
Special Issue 3.2.3.1: No anomalous conditions were observed. Grease application was nominal.		

Preliminary PFAR(s)? _____ Yes _____ ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes _____ ☒ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/Sil and Port Condition (At Removal)

Motor No.: 360T028	Side: Left (A)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Marc Lyon		
Location: Aft End Ring-to-Fixed Housing (Joint #5)		

<u>Leak Check Plug Observations:</u>	Yes	No	Comment #
A. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Soot To or Past O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Heat Affected or Eroded O-ring (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Excessive or No Grease on O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Excessive Grease on Plug?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I. Thread Damage (Visible at Removal)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

<u>Leak Check Port Observations:</u>	Yes	No	Comment #
J. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
L. Excessive Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
N. Metal Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
O. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
P. Obstructed Through Hole?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

Breakaway Torque - 40 in-lbs
Running Torque - 15 in-lbs

Preliminary PFAR(s)? Yes ☒ No

Clarification Form(s)? Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4
Leak Check Plug/Sil Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Marv Lyon		
Location: Aft End Ring-to-Fixed Housing (Joint #5)		

Leak Check Plug Observations:

- A. Foreign Material Between the O-ring and Plug?
B. Heat Affected Metal?
C. Seal Surface/Thread Damage?

Yes

No

Comment #

_____/_____
✓

_____/_____
✓

_____/_____
✓

Notes / Comments

Preliminary PFAR(s)? _____ Yes _____ ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes _____ ☒ No

Clarification Form Page No.(s): _____

REVISION _____

DOC NO.	TWR-64216	VOL
SEC	PAGE	B-30

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6
Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Mark Lynn		
Location: Aft End Ring-to-Fixed Housing (Joint #5)		
Secondary O-ring Observations:		
	Yes	No
A. Heat Affected or Eroded O-ring?	_____	_____/_____ ✓
B. O-ring Defects/Damage?	_____	_____/_____ ✓
Notes / Comments		

Preliminary PFAR(s)? Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? Yes ☒ No Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-8
Packing With Retainer Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Mavis Lyon		
Joint: Aft End Ring-to-Fixed Housing (Joint #5)		
Packing With Retainer Observations:	Yes	No
A. Heat Affected or Eroded Seal or Retainer?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Seal or Retainer Damage/Defects?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Notes / Comments

- 1) All 72 packings with retainers had typical disassembly damage to the rubber seal.

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9
Case Factory Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 04-05-93
Assessment Engineer(s)/Inspector(s): GARY W. ASPER (QA.)		
Factory Joint: Forward Dome		
Case Factory Joint Observations:		
	Yes	No
A. Heat Affected or Eroded Joint O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Heavy Corrosion in Joint?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Heavy Corrosion in Leak Check Port?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.</p>		
Notes / Comments		
Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Preliminary PFAR Number(s): _____		

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): _____

Motor No.: 360T028	Side: Left (A)	Date: 04-05-93
Assessment Engineer(s)/Inspector(s): H. ZAREMBA		
Factory Joint: Forward		
<u>Case Factory Joint Observations:</u>		
	Yes	No
A. Heat Affected or Eroded Joint O-ring?	_____	X _____
B. Heavy Corrosion in Joint?	_____	X _____
C. Heavy Corrosion in Leak Check Port?	_____	X _____
<p>Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.</p>		
Notes / Comments		
<p>#1 Note: Pitting exists on tang seal of case to case factory joint @ approximately 110.5°. S/m S/N 0000079</p>		
Preliminary PFAR(s)? _____ Yes <input checked="" type="checkbox"/> No Preliminary PFAR Number(s): _____		

Clarification Form(s)? _____ Yes ☒ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9
Case Factory Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 6-28-93
Assessment Engineer(s)/Inspector(s): R. BURNS		
Factory Joint: Forward Center		
Case Factory Joint Observations:		
	Yes	No
A. Heat Affected or Eroded Joint O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Heavy Corrosion in Joint?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Heavy Corrosion in Leak Check Port?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.</p>		
Notes / Comments		
None		
Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Preliminary PFAR Number(s): _____		
Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Clarification Form Page No.(s): _____		

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9
Case Factory Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 04-02-93
Assessment Engineer(s)/Inspector(s): C. Brown		
Factory Joint: ET Attach/Stiffener		
Case Factory Joint Observations:		
	Yes	No
A. Heat Affected or Eroded Joint O-ring?	_____	_____✓_____
B. Heavy Corrosion In Joint?	_____	_____✓_____
C. Heavy Corrosion In Leak Check Port?	_____	_____✓_____
Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.		
Notes / Comments NONE		

Preliminary PFAR(s)? _____ Yes _____ ✓ No Preliminary PFAR Number(s): N/A

Clarification Form(s)? _____ Yes _____ ✓ No Clarification Form Page No.(s): N/A

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9
Case Factory Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 04-02-93
Assessment Engineer(s)/Inspector(s): <i>C. Brown</i>		
Factory Joint: Stiffener/Stiffener		
Case Factory Joint Observations:		
	Yes	No
A. Heat Affected or Eroded Joint O-ring?	_____	✓ _____
B. Heavy Corrosion in Joint?	_____	✓ _____
C. Heavy Corrosion in Leak Check Port?	_____	✓ _____
<p>Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.</p>		
Notes / Comments <i>NONE</i>		

Preliminary PFAR(s)? _____ Yes _____ ✓ No

Preliminary PFAR Number(s): *N/A*

Clarification Form(s)? _____ Yes _____ ✓ No

Clarification Form Page No.(s): *N/A*

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9
Case Factory Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 04-02-93
Assessment Engineer(s)/Inspector(s): C. Brown		
Factory Joint: Aft Dome		
Case Factory Joint Observations:		
	Yes	No
A. Heat Affected or Eroded Joint O-ring?	_____	_____✓
B. Heavy Corrosion in Joint?	_____	_____✓
C. Heavy Corrosion in Leak Check Port?	_____	_____✓
Comment # _____ _____ _____		
<p>Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.</p>		
Notes / Comments NONE		

Preliminary PFAR(s)? _____ Yes _____ No ✓ Preliminary PFAR Number(s): N/A

Clarification Form(s)? _____ Yes _____ No ✓ Clarification Form Page No. (s): N/A

POSTFLIGHT OBSERVATION RECORD (PFOR) B-10
Case Y-Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 31 Aug 93
Assessment Engineer(s)/Inspector(s): NA		
Y-Joint: Forward Dome		
<u>Case Y-Joint Observations:</u>	Yes	No
A. Corrosion?	NA	NA
Comment # 1		
Notes / Comments Special Issue 3.2.1.1 1. Assessment was not done.		
Preliminary PFAR(s)?	Yes	No
Preliminary PFAR Number(s):		

Clarification Form(s)? Yes No

Clarification Form Page No. (s):

POSTFLIGHT OBSERVATION RECORD (PFOR) B-10
Case Y-Joint Condition

Motor No.: 360T028	Side: Left (A)	Date:
Assessment Engineer(s)/Inspector(s):		
Y-Joint: Aft Dome		
<u>Case Y-Joint Observations:</u>	Yes	No
A. Corrosion?	_____	_____
Comment # _____		
Notes / Comments		
Special Issue 3.2.1.1		
Preliminary PFAR(s)? _____ Yes _____ No		
Preliminary PFAR Number(s): _____		

Clarification Form(s)? _____ Yes _____ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-2
S&A Device (Barrier-Booster and Environmental Seal Regions) Condition

Motor No.: 360T028	Side: Right (B)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): b. Hyer, D. Garecht, M. Lyon, D. Bullard, C. Taylor, J. Lish		
<u>Barrier-Booster Bore and Rotor Observations:</u>		
	Yes	No
A. Heat Affected or Eroded O-ring (In Groove)?	_____	✓
B. Soot To or Past O-rings?	_____	✓
C. Heat Affected Metal?	_____	✓
D. O-ring Damage (In Groove)?	_____	✓
E. Metal Damage?	✓	_____
F. Excessive or No Grease?	_____	✓
G. Corrosion?	_____	✓
H. Foreign Material?	_____	✓
I. Teflon Retainer Damage?	_____	✓
		1
<u>Environmental Seal Region Observations:</u>		
J. Environmental O-ring Assembly Damage (Visible Without Magnification)?	_____	✓
K. Foreign Material?	_____	✓

Notes / Comments

1. Minor thread damage (two small dings) exist on first thread of Safing Pin Retainer (Arm Monitor). Small metal shavings present in safing pin retainer cap.

Preliminary PFAR(s)? ☒ Yes ☐ No **Preliminary PFAR Number(s):** 530-08

Clarification Form(s)? ☐ Yes ☒ No **Clarification Form Page No.(s):** _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-7
S&A Rotor Shaft O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): <i>G. Hyer, D. Garecht, M. Lyon, D. Bullard, G. Taylor, J. Edwards</i>		
Location: S&A Device Barrier-Booster Rotor Shaft		
Forward Primary O-ring Observations:		
A. Heat Affected or Eroded O-ring?	Yes _____ No <u>✓</u>	Comment # _____
B. O-ring Defects/Damage?	Yes _____ No <u>✓</u>	Comment # _____
Aft Primary O-ring Observations:		
C. Heat Affected or Eroded O-ring?	Yes _____ No <u>✓</u>	Comment # _____
D. O-ring Defects/Damage?	Yes _____ No <u>✓</u>	Comment # _____
Forward Secondary O-ring Observations:		
E. Heat Affected or Eroded O-ring?	Yes _____ No <u>✓</u>	Comment # _____
F. O-ring Defects/Damage?	Yes _____ No <u>✓</u>	Comment # _____
Aft Secondary O-ring Observations:		
G. Heat Affected or Eroded O-ring?	Yes _____ No <u>✓</u>	Comment # _____
H. O-ring Defects/Damage?	Yes _____ No <u>✓</u>	Comment # _____
Notes / Comments		
Preliminary PFAR(s)? _____ Yes _____ No <u>✓</u> Preliminary PFAR Number(s): _____		
Clarification Form(s)? _____ Yes _____ No <u>✓</u> Clarification Form Page No.(s): _____		

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Right (B)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): G. Hyer, D. Barecht, M. Lyon, D. Bullock, C. Taylor, J. Richards		
Location: 126-Degree Barrier-Booster Bore		

Leak Check Plug Observations:

	Yes	No	Comment #
A. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Soot To or Past O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Heat Affected or Eroded O-ring (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Excessive or No Grease on O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Excessive Grease on Plug?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I. Thread Damage (Visible at Removal)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Leak Check Port Observations:

J. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
L. Excessive Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
N. Metal Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
O. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
P. Obstructed Through Hole?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

Preliminary PFAR(s)? ☐ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4
Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): <i>G. Hyer, D. Barecht, M. Lynn, D. Bullard, C. Taylor, J. Richardson</i>		
Location: 126-Degree Barrier-Booster Bore		

Leak Check Plug Observations:

	Yes	No	Comment #
A. Foreign Material Between the O-ring and Plug?	_____	<u>✓</u>	_____
B. Heat Affected Metal?	_____	<u>✓</u>	_____
C. Seal Surface/Thread Damage?	_____	<u>✓</u>	_____

Notes / Comments

Preliminary PFAR(s)? _____ Yes _____ ✓ No Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes _____ ✓ No Clarification Form Page No.(s): _____

REVISION _____

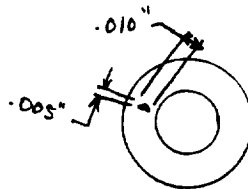
POSTFLIGHT OBSERVATION RECORD (PFOR) B-6
Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 21 Dec 92
Assessment Engineer(s)/Inspector(s): G. HYER, D. GRECHT, M. LYON, C. TAYLOR, J. RICHARDS		
Location: 128-Degree Barrier-Booster Bore		

Secondary O-ring Observations:	Yes	No	Comment #
A. Heat Affected or Eroded O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. O-ring Defects/Damage?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	# 1

Notes / Comments

A SMALL CUT WAS OBSERVED ON THE SIDE WALL OF THE C-RING.
SEE SKETCH BELOW FOR MEASUREMENT & CLARIFICATION.



Preliminary PFAR(s)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Preliminary PFAR Number(s): 53C -10
Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Right (B)	Date: 21 Dec 92
Assessment Engineer(s)/Inspector(s): G. Hue, D. Gerecht, M. Lyon, D. Bullard, C. Taylor, J. Richards		
Location: 18-Degree SII		

SII Observations:

	Yes	No	Comment #
A. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Soot To or Past O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Heat Affected or Eroded O-ring (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Excessive or No Grease on O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Excessive Grease on SII?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I. Thread Damage (Visible at Removal)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

SII Port Observations:

J. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
L. Excessive Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
N. Metal Damage?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
O. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	# 1
P. Obstructed Leak Check Through Hole?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

1. Typical galling on land between primary & secondary seal surface. galling is due to sealing washer weld.

Preliminary PFAR(s)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Preliminary PFAR Number(s):	
Clarification Form(s)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Clarification Form Page No.(s):	

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4
Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 21 Dec 92
Assessment Engineer(s)/Inspector(s): G. Hye, D. Gorecht, M. Lynn, J. Richardson, D. Ballard, C. Taylor		
Location: 18-Degree SII		

SII Observations:	Yes	No	Comment #
A. Foreign Material Between the O-ring and SII?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. Seal Surface/Thread Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Notes / Comments

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____
Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): _____

REVISION _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6
Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 21 Dec 92
Assessment Engineer(s)/Inspector(s): G. Hyer, D. Karsch, M. Lyon, D. Bullard, C. Taylor, J. Richards		
Location: 18-Degree SII		
Primary O-ring Observations:		
Yes	No	Comment #
A. Heat Affected or Eroded O-ring?	<input checked="" type="checkbox"/>	
B. O-ring Defects/Damage?	<input checked="" type="checkbox"/>	
Secondary O-ring Observations:		
Yes	No	Comment #
C. Heat Affected or Eroded O-ring?	<input checked="" type="checkbox"/>	
D. O-ring Defects/Damage?	<input checked="" type="checkbox"/>	
Notes / Comments		

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Right (B)	Date: 21 Dec 92
Assessment Engineer(s)/Inspector(s): G. Hyer, D. Garecht, M. Lynn, D. Bullard, C. Taylor, J. Richardson		
Location: 198-Degree SII		

SII Observations:

	Yes	No	Comment #
A. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Soot To or Past O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Heat Affected or Eroded O-ring (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Excessive or No Grease on O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Excessive Grease on SII?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I. Thread Damage (Visible at Removal)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

SII Port Observations:

J. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
L. Excessive Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
N. Metal Damage?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> not	# 1
O. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
P. Obstructed Leak Check Through Hole?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

#1. Typical galling on land between primary & secondary seal surface
galling is due to sealing washer weld.

Preliminary PFAR(s)? ☐ Yes ☒ No **Preliminary PFAR Number(s):** _____

Clarification Form(s)? ☐ Yes ☒ No **Clarification Form Page No.(s):** _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4
Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): G. Hyer, D. Garrecht, M. Lyon, D. Bullard, C. Taylor, J. Richards		
Location: 198-Degree SII		
SII Observations:		
	Yes	No
A. Foreign Material Between the O-ring and SII?	_____	✓
B. Heat Affected Metal?	_____	✓
C. Seal Surface/Thread Damage?	_____	✓

Notes / Comments

Preliminary PFAR(s)? _____ Yes _____ No Preliminary PFAR Number(s): _____
Clarification Form(s)? _____ Yes _____ No Clarification Form Page No.(s): _____

REVISION _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6
Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector(s): <u>B. Hyer, D. Barecht, M. Lyon, D. Bullard, C. Taylor, J. Schenk</u>		
Location: 198-Degree SII		
<u>Primary O-ring Observations:</u>	Yes	No
A. Heat Affected or Eroded O-ring?	_____	<u>✓</u>
B. O-ring Defects/Damage?	_____	<u>✓</u>
<u>Secondary O-ring Observations:</u>		
C. Heat Affected or Eroded O-ring?	_____	<u>✓</u>
D. O-ring Defects/Damage?	_____	<u>✓</u>

Notes / Comments

Preliminary PFAR(s)? _____ Yes ✓ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes ✓ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-3
Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): D. Garecht, M. Nolan		
Joint: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)		
Internal Nozzle Joint Observations:		
A. Soot To or Past O-rings?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
B. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
D. RTV in Contact With or Past the Primary O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
E. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
F. Heat Affected or Eroded O-rings (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
G. Excessive or No Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
H. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
I. Metal Damage?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Notes / Comments

① Soot to primary intermittent 90°-185°
② Intermittent light-medium corrosion full circumference.

Preliminary PFAR(s)?	Yes	No <input checked="" type="checkbox"/>	Preliminary PFAR Number(s):
Clarification Form(s)?	Yes	No <input checked="" type="checkbox"/>	Clarification Form Page No. (s):

POSTFLIGHT OBSERVATION RECORD (PFOR) B-5
Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): D. Garecht, M. Nolan		
Joint: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)		
<u>Primary O-ring Observations:</u>	Yes	No
A. Heat Affected or Eroded O-ring?	_____	_____✓
B. O-ring Damage/Defects?	_____	_____✓
<u>Secondary O-ring Observations:</u>		
A. Heat Affected or Eroded O-ring?	_____	_____✓
B. O-ring Damage/Defects?	_____	_____✓
Notes / Comments		

Preliminary PFAR(s)? _____ Yes _____ No ✓ Preliminary PFAR Number(s): _____
Clarification Form(s)? _____ Yes _____ No ✓ Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): D. Barecht, M. Nolan		
Location: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)		

Leak Check Plug Observations:

	Yes	No	Comment #
A. Sooted Metal Surfaces?		✓	
B. Soot To or Past O-ring?		✓	
C. Foreign Material?		✓	
D. O-ring Damage (In Groove)?		✓	
E. Heat Affected or Eroded O-ring (In Groove)?		✓	
F. Excessive or No Grease on O-ring?		✓	
G. Excessive Grease on Plug?		✓	
H. Corrosion?		✓	
I. Thread Damage (Visible at Removal)?		✓	

Leak Check Port Observations:

J. Sooted Metal Surfaces?		✓	
K. Foreign Material?		✓	
L. Excessive Grease?		✓	
M. Corrosion?		✓	
N. Metal Damage?		✓	
O. Heat Affected Metal?		✓	
P. Obstructed Through Hole?		✓	

Notes / Comments

Breakaway: 38 in. lb
Running: 7 in. lb

Preliminary PFAR(s)?	Yes	<input checked="" type="checkbox"/> No	Preliminary PFAR Number(s):
Clarification Form(s)?	Yes	<input checked="" type="checkbox"/> No	Clarification Form Page No. (s):

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4
Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): D. Garecht, M. Nolan		
Location: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)		
Leak Check Plug Observations:	Yes	No
A. Foreign Material Between the O-ring and Plug?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Seal Surface/Thread Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Notes / Comments

Preliminary PFAR(s)? ☐ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6
Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

(Leak Check Plug/Sh) O-ring Condition (Detailed)		
Motor No.: 360T028	Side: Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): Diane Garscht, Mike Nolan		
Location: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)		
<u>Secondary O-ring Observations:</u>		
A. Heat Affected or Eroded O-ring?	Yes _____ _____	No <input checked="" type="checkbox"/> _____
B. O-ring Defects/Damage?	 _____ _____	 <input checked="" type="checkbox"/> _____
Notes / Comments		
Preliminary PFAR(s)? Yes <input checked="" type="checkbox"/> No Preliminary PFAR Number(s): _____		

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-3
Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 12/16/92	
Assessment Engineer(s)/Inspector(s): Diane Garecht, Mike Nolan			
Joint: Nose Inlet-to-Throat (Joint #3)			
Internal Nozzle Joint Observations:	Yes	No	Comment #
A. Soot To or Past O-rings?	_____	✓ _____	_____
B. Heat Affected Metal?	_____	✓ _____	_____
C. Foreign Material?	_____	✓ _____	_____
D. RTV In Contact With or Past the Primary O-ring?	_____	✓ _____	_____
E. O-ring Damage (In Groove)?	_____	✓ _____	_____
F. Heat Affected or Eroded O-rings (In Groove)?	_____	✓ _____	_____
G. Excessive or No Grease?	_____	✓ _____	_____
H. Corrosion?	✓ _____	_____	① _____
I. Metal Damage?	_____	✓ _____	_____

Notes / Comments

①
Light/medium corrosion intermittent full circumference
(nose inlet and throat)

Preliminary PFAR(s)? _____ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes ☒ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-5
Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 12/16/92	
Assessment Engineer(s)/Inspector(s): <u>D. Garecht, Mike Nolan</u>			
Joint: Nose Inlet-to-Throat (Joint #3)			
Primary O-ring Observations:			
A. Heat Affected or Eroded O-ring?	Yes _____ _____	No <u>✓</u> _____	Comment # _____ _____
B. O-ring Damage/Defects?	_____ _____	<u>✓</u> _____	_____ _____
Secondary O-ring Observations:			
A. Heat Affected or Eroded O-ring?	_____ _____	<u>✓</u> _____	_____ _____
B. O-ring Damage/Defects?	_____ _____	<u>✓</u> _____	_____ _____
Notes / Comments			

Preliminary PFAR(s)? Yes ✓ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? Yes ✓ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/Sil and Port Condition (At Removal)

Motor No.: 360T028	Side: Right (B)	Date: 12/16/92
Assessment Engineer(s)/Inspector(s): Diane Garecht, Mike Nolan		
Location: Nose Inlet-to-Throat (Joint #3)		

Leak Check Plug Observations:

- A. Sooted Metal Surfaces?
- B. Soot To or Past O-ring?
- C. Foreign Material?
- D. O-ring Damage (In Groove)?
- E. Heat Affected or Eroded O-ring (In Groove)?
- F. Excessive or No Grease on O-ring?
- G. Excessive Grease on Plug?
- H. Corrosion?
- I. Thread Damage (Visible at Removal)?

Yes	No	Comment #
	✓	
	✓	
	✓	
	✓	
	✓	
	✓	
	✓	
	✓	
	✓	

Leak Check Port Observations:

- J. Sooted Metal Surfaces?
- K. Foreign Material?
- L. Excessive Grease?
- M. Corrosion?
- N. Metal Damage?
- O. Heat Affected Metal?
- P. Obstructed Through Hole?

	✓	
	✓	
	✓	
	✓	
	✓	
	✓	
	✓	

Notes / Comments

Breakaway 45 in 1b
Running 25 in 1b

Preliminary PFAR(s)? Yes ✓ No Preliminary PFAR Number(s): _____
Clarification Form(s)? Yes ✓ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4
Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 12/16/92
Assessment Engineer(s)/Inspector(s): D. Barecht, Mike Nolan		
Location: Nose Inlet-to-Throat (Joint #3)		
Leak Check Plug Observations:		
	Yes	No
A. Foreign Material Between the O-ring and Plug?	_____	✓ _____
B. Heat Affected Metal?	_____	✓ _____
C. Seal Surface/Thread Damage?	_____	✓ _____
Comment #		

Notes / Comments

Preliminary PFAR(s)? _____ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes ☒ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-3
Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 12-15 97
Assessment Engineer(s)/Inspector(s): Ricky Ash, Gordon Hyer, Mark Lyon		
Joint: Throat-to-Forward Exit Cone (Joint #4)		
Internal Nozzle Joint Observations:		
	Yes	No
A. Soot To or Past O-rings?		✓
B. Heat Affected Metal?		✓
C. Foreign Material?		✓
D. RTV in Contact With or Past the Primary O-ring?	✓	
E. O-ring Damage (In Groove)?		✓
F. Heat Affected or Eroded O-rings (In Groove)?		✓
G. Excessive or No Grease?		✓
H. Corrosion?	✓	
I. Metal Damage?		✓

Notes / Comments

- 1) RTV reached the primary O-ring between 105° - 362.5°
- 2) Light corrosion observed between the primary and secondary O-rings intermittent full circumference (Throat) Non-seal/surface
Light-to-medium corrosion observed between the phenolic and secondary O-ring footprint intermittent full circumference (Forward Exit Cone).

Preliminary PFAR(s)? Yes ☒ No ☒

Preliminary PFAR Number(s): _____

Clarification Form(s)? Yes ☒ No ☒

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-5
Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Mark Lyon		
Joint: Throat-to-Forward Exit Cone (Joint #4)		
Primary O-ring Observations:		
A. Heat Affected or Eroded O-ring?	Yes _____ No _____ <input checked="" type="checkbox"/>	Comment # _____ _____ _____
B. O-ring Damage/Defects?	_____ _____ <input checked="" type="checkbox"/>	_____ _____ _____
Secondary O-ring Observations:		
A. Heat Affected or Eroded O-ring?	_____ _____ <input checked="" type="checkbox"/>	_____ _____ _____
B. O-ring Damage/Defects?	_____ _____ <input checked="" type="checkbox"/>	_____ _____ _____
Notes / Comments		
Preliminary PFAR(s)? Yes <input checked="" type="checkbox"/> No Preliminary PFAR Number(s): _____		
Clarification Form(s)? Yes <input checked="" type="checkbox"/> No Clarification Form Page No.(s): _____		

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Right (B)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Mary Lyon		
Location: Throat-to-Forward Exit Cone (Joint #4)		

<u>Leak Check Plug Observations:</u>	Yes	No	Comment #
A. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Soot To or Past O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Heat Affected or Eroded O-ring (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Excessive or No Grease on O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Excessive Grease on Plug?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I. Thread Damage (Visible at Removal)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

<u>Leak Check Port Observations:</u>	Yes	No	Comment #
J. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
L. Excessive Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
N. Metal Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
O. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
P. Obstructed Through Hole?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

Breakaway Torque - 40
Running Torque - 9

Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Preliminary PFAR Number(s): _____
Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6
Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Marv Lynn		
Location: Throat-to-Forward Exit Cone (Joint #4)		

Secondary O-ring Observations:

A. Heat Affected or Eroded O-ring?

Yes

No

Comment #

B. O-ring Defects/Damage?

Notes / Comments

Preliminary PFAR(s)? _____ Yes _____ ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes _____ ☒ No

Clarification Form Page No.(s): _____

REVISION _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-3
Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Karl Shupe		
Joint: Aft End Ring-to-Fixed Housing (Joint #5)		
Internal Nozzle Joint Observations:	Yes	No
A. Soot To or Past O-rings?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
D. RTV in Contact With or Past the Primary O-ring?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
F. Heat Affected or Eroded O-rings (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
G. Excessive or No Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
H. Corrosion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
I. Metal Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Comment #		
1		
2		
Notes / Comments		

- 1) RTV reached the primary O-ring between 170-195 and 335-0-8 degrees.
- 2) Medium corrosion observed on the aft end flange I.D. intermittent full circumference.

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-5
Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Karl Shupe		
Joint: Aft End Ring-to-Fixed Housing (Joint #5)		
Primary O-ring Observations:		
Yes	No	Comment #
A. Heat Affected or Eroded O-ring?	<input checked="" type="checkbox"/>	
B. O-ring Damage/Defects?	<input checked="" type="checkbox"/>	
Secondary O-ring Observations:		
Yes	No	Comment #
A. Heat Affected or Eroded O-ring?	<input checked="" type="checkbox"/>	
B. O-ring Damage/Defects?	<input checked="" type="checkbox"/>	
Notes / Comments		
Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Preliminary PFAR Number(s): _____		

Clarification Form(s)? ☐ Yes ☒ No **Clarification Form Page No.(s):** _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1
Leak Check Plug/Sil and Port Condition (At Removal)

Motor No.: 360T028	Side: Right (B)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Karl Shupe		
Location: Aft End Ring-to-Fixed Housing (Joint #5)		

Leak Check Plug Observations:

	Yes	No	Comment #
A. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Soot To or Past O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. O-ring Damage (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Heat Affected or Eroded O-ring (In Groove)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Excessive or No Grease on O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Excessive Grease on Plug?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I. Thread Damage (Visible at Removal)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Leak Check Port Observations:

J. Sooted Metal Surfaces?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
L. Excessive Grease?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
N. Metal Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
O. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
P. Obstructed Through Hole?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

Breakaway Torque - 37 in-lbs
Running Torque - 10 in-lbs

Preliminary PFAR(s)? ☐ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4
Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Karl Shupe		
Location: Aft End Ring-to-Fixed Housing (Joint #5)		
Leak Check Plug Observations:		
	Yes	No
A. Foreign Material Between the O-ring and Plug?	_____	✓ _____
B. Heat Affected Metal?	_____	✓ _____
C. Seal Surface/Thread Damage?	_____	✓ _____
Notes / Comments		

Preliminary PFAR(s)? Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? Yes ☒ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6
Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Karl Shupe, Gordon Hyer		
Location: Aft End Ring-to-Fixed Housing (Joint #5)		
Secondary O-ring Observations:		
Yes	No	Comment #
_____	_____ <input checked="" type="checkbox"/> _____	_____
A. Heat Affected or Eroded O-ring?		
_____	_____ <input checked="" type="checkbox"/> _____	_____
B. O-ring Defects/Damage?		
Notes / Comments		
Preliminary PFAR(s)? _____ Yes _____ <input checked="" type="checkbox"/> No _____ Preliminary PFAR Number(s): _____		
Clarification Form(s)? _____ Yes _____ <input checked="" type="checkbox"/> No _____ Clarification Form Page No.(s): _____		

POSTFLIGHT OBSERVATION RECORD (PFOR) B-8
Packing With Retainer Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Karl Shupe		
Joint: Aft End Ring-to-Fixed Housing (Joint #5)		
Packing With Retainer Observations:		
	Yes	No
A. Heat Affected or Eroded Seal or Retainer?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B. Seal or Retainer Damage/Defects?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C. Corrosion?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Comment #		
1		
Notes / Comments		
1) Typical disassembly damage to all 72 packings with retainers rubber seal.		
Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Preliminary PFAR Number(s):		
Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Clarification Form Page No.(s):		

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9
Case Factory Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 4-22-93
Assessment Engineer(s)/Inspector(s): H. ZAREMBA		
Factory Joint: Forward		
Case Factory Joint Observations:		
	Yes	No
A. Heat Affected or Eroded Joint O-ring?	_____	X _____
B. Heavy Corrosion in Joint?	_____	X _____
C. Heavy Corrosion in Leak Check Port?	_____	X _____
<p>Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.</p>		
Notes / Comments		

Preliminary PFAR(s)? _____ Yes _____ No Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes _____ No Clarification Form Page No.(s): _____

REVISION _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9
Case Factory Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 7-13-93
Assessment Engineer(s)/Inspector(s): RICH		
Factory Joint: Forward Center		
Case Factory Joint Observations:		
	Yes	No
A. Heat Affected or Eroded Joint O-ring?	_____	<u>X</u>
B. Heavy Corrosion in Joint?	_____	<u>X</u>
C. Heavy Corrosion in Leak Check Port?	_____	<u>X</u>
<p>Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.</p>		
Notes / Comments		

Preliminary PFAR(s)? _____ Yes X No Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes X No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9
Case Factory Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 6-22-93
Assessment Engineer(s)/Inspector(s): D. MARBLE		
Factory Joint: Aft Center		
Case Factory Joint Observations:		
	Yes	No
A. Heat Affected or Eroded Joint O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Heavy Corrosion in Joint?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Heavy Corrosion in Leak Check Port?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.</p>		
Notes / Comments		
NONE		
Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Preliminary PFAR Number(s): _____		

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9
Case Factory Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 04-01-93
Assessment Engineer(s)/Inspector(s): C. BROWN		
Factory Joint: ET Attach/Stiffener		
Case Factory Joint Observations:		
	Yes	No
A. Heat Affected or Eroded Joint O-ring?	_____	✓
B. Heavy Corrosion in Joint?	_____	✓
C. Heavy Corrosion in Leak Check Port?	_____	✓
Comment # _____		
Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.		
Notes / Comments NONE		

Preliminary PFAR(s)? _____ Yes _____ ✓ No

Preliminary PFAR Number(s): N/A

Clarification Form(s)? _____ Yes _____ ✓ No

Clarification Form Page No.(s): N/A

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9
Case Factory Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 04-01-93
Assessment Engineer(s)/Inspector(s): C. BROWN		
Factory Joint: Stiffener/Stiffener		
Case Factory Joint Observations:		
	Yes	No
A. Heat Affected or Eroded Joint O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Heavy Corrosion in Joint?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Heavy Corrosion in Leak Check Port?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.</p>		
Notes / Comments NONE		

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): N/A

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): N/A

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9
Case Factory Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 04-01-93
Assessment Engineer(s)/Inspector(s): C. BROWN		
Factory Joint: Aft Dome		
Case Factory Joint Observations:	Yes	No
A. Heat Affected or Eroded Joint O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Heavy Corrosion in Joint?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Heavy Corrosion in Leak Check Port?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Comment #		
<p>Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.</p>		
Notes / Comments NONE		

ENTERED WRONG
BOX
04-01-93

Preliminary PFAR(s)? ☒ Yes ☒ No

Preliminary PFAR Number(s): N/A

Clarification Form(s)? ☒ Yes ☒ No

Clarification Form Page No.(s): N/A

POSTFLIGHT OBSERVATION RECORD (PFOR) B-10
Case Y-Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 31 Aug 93
Assessment Engineer(s)/Inspector(s): NA		
Y-Joint: Forward Dome		
<u>Case Y-Joint Observations:</u>		
A. Corrosion?	Yes NA	No NA Comment # 1

Notes / Comments

Special Issue 3.2.1.1

1. Assessment was not done.

Preliminary PFAR(s)? ☐ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s): _____

REVISION _____

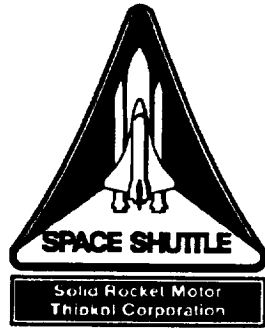
DOC NO.	TWR-64216	VOL
SEC	PAGE	B-81

POSTFLIGHT OBSERVATION RECORD (PFOR) B-10
Case Y-Joint Condition

Motor No.: 360T028	Side: Right (B)	Date:
Assessment Engineer(s)/Inspector(s):		
Y-Joint: Aft Dome		
<u>Case Y-Joint Observations:</u>	Yes	No
A. Corrosion?	_____	_____
Comment # _____		
Notes / Comments Special Issue 3.2.1.1		
Preliminary PFAR(s)? _____ Yes _____ No Preliminary PFAR Number(s): _____		

Clarification Form(s)? _____ Yes _____ No Clarification Form Page No. (s): _____

REVISION _____



Appendix C Nozzle PFORs

Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

November 1993

Prepared for:

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812**

Contract No.	NAS8-38100
DR No.	4-23
WBS No.	4C601-04-01
ECS No.	SS4771

***Thiokol* CORPORATION**
SPACE OPERATIONS

P.O. Box 707, Brigham City, Utah 84302-0707 (801) 863-3511

NOZZLE REQUIRED EVALUATION FORMS LIST

<u>PFOR #</u>	<u>Title</u>	<u>Side</u>	<u>Joint, Part, or Location</u>	<u>Final Report Page Number</u>
C-1	Nozzle Assembly Quick-look Condition	Left	N/A	C-1
C-2	Nozzle Joint Condition	Left	Joint #2	C-2
C-3	Nose Inlet-to-Flex Bearing-to-Cowl Joint Condition Drawing Worksheet	Left	Joint #2	C-3
C-2	Nozzle Joint Condition	Left	Joint #3	C-4
C-4	Nose Inlet-to-Throat Joint Condition Drawing Worksheet	Left	Joint #3	C-5
C-2	Nozzle Joint Condition	Left	Joint #4	C-6
C-5	Throat-to-Forward Exit Cone Joint Condition Drawing Worksheet	Left	Joint #4	C-7
C-2	Nozzle Joint Condition	Left	Joint #5	C-8
C-6	Aft End Ring-to-Fixed Housing Joint Condition Drawing Worksheet	Left	Joint #5	C-9
C-7	Cowl Insulation Segment Condition	Left	Cowl	C-10
C-8	Flexible Bearing, Flexible Bearing Protector, and Flexible Boot Condition	Left	Flexible Bearing, Protector, & Boot	C-11
C-9	Flexible Bearing Protector Thickness Measurements	Left	Flexible Bearing Protector	C-12
C-10	Throat Diameter Measurements	Left	Throat	C-13

(Note: Clarification PFORs will be inserted after the applicable required PFOR in the Final Report and will have the same page number as the required PFOR appended by a sequential alphabetic extension.)

REVISION _____

DOC NO. TWR-64216	VOL	
SEC	PAGE C-i	

NOZZLE REQUIRED EVALUATION FORMS LIST (Cont.)

<u>PFOR #</u>	<u>Title</u>	<u>Side</u>	<u>Joint, Part, or Location</u>	<u>Final Report Page Number</u>
C-11	Outer Boot Ring Char and Erosion Measurements and Flexible Boot Condition	Left	Outer Boot Ring & Flexible Boot	C-14
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Aft Exit Cone	C-15
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Forward Exit Cone	C-16
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Throat	C-17
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Forward Nose & Aft Inlet Rings	C-18
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Nose Cap	C-19
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Cowl	C-20
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Fixed Housing	C-21
C-13	Cowl Ring Phenolic (SCP) Section Condition	Left	Cowl	C-22
C-14	Forward Exit Cone Phenolic (CCP) Section Condition	Left	Forward Exit Cone	C-23
C-15	Fixed Housing Phenolic (CCP) Section Condition	Left	Fixed Housing	C-24
C-16	Throat Inlet Assembly Phenolic (CCP) Section Condition	Left	Throat	C-25
C-17	Nose Cap Phenolic (CCP) Section Condition	Left	Nose Cap	C-26
C-18	Forward Nose Ring and Aft Inlet Ring Phenolic (CCP) Section Condition	Left	Forward Nose & Aft Inlet Rings	C-27
	Aft Exit Cone Phenolic (CCP) Condition	Left	Aft Exit Cone	C-55

(Note: Clarification PFORs will be inserted after the applicable required PFOR in the Final Report and will have the same page number as the required PFOR appended by a sequential alphabetic extension.)

NOZZLE REQUIRED EVALUATION FORMS LIST (Cont.)

<u>PFOR #</u>	<u>Title</u>	<u>Side</u>	<u>Joint, Part, or Location</u>	<u>Final Report Page Number</u>
C-1	Nozzle Assembly Quick-look Condition	Right	N/A	C-28
C-2	Nozzle Joint Condition	Right	Joint #2	C-29
C-3	Nose Inlet-to-Flex Bearing-to-Cowl Joint Condition Drawing Worksheet	Right	Joint #2	C-30
C-2	Nozzle Joint Condition	Right	Joint #3	C-31
C-4	Nose Inlet-to-Throat Joint Condition Drawing Worksheet	Right	Joint #3	C-32
C-2	Nozzle Joint Condition	Right	Joint #4	C-33
C-5	Throat-to-Forward Exit Cone Joint Condition Drawing Worksheet	Right	Joint #4	C-34
C-2	Nozzle Joint Condition	Right	Joint #5	C-35
C-6	Aft End Ring-to-Fixed Housing Joint Condition Drawing Worksheet	Right	Joint #5	C-36
C-7	Cowl Insulation Segment Condition	Right	Cowl	C-37
C-8	Flexible Bearing, Flexible Bearing Protector, and Flexible Boot Condition	Right	Flexible Bearing, Protector, & Boot	C-38
C-9	Flexible Bearing Protector Thickness Measurements	Right	Flexible Bearing Protector	C-39
C-10	Throat Diameter Measurements	Right	Throat	C-40

(Note: Clarification PFORs will be inserted after the applicable required PFOR in the Final Report and will have the same page number as the required PFOR appended by a sequential alphabetic extension.)

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NOZZLE REQUIRED EVALUATION FORMS LIST (Cont.)

<u>PFOR #</u>	<u>Title</u>	<u>Side</u>	<u>Joint, Part, or Location</u>	<u>Final Report Page Number</u>
C-11	Outer Boot Ring Char and Erosion Measurements and Flexible Boot Condition	Right	Outer Boot Ring & Flexible Boot	C-41
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Aft Exit Cone	C-42
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Forward Exit Cone	C-43
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Throat	C-44
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Forward Nose & Aft Inlet Rings	C-45
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Nose Cap	C-46
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Cowl	C-47
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Fixed Housing	C-48
C-13	Cowl Ring Phenolic (SCP) Section Condition	Right	Cowl	C-49
C-14	Forward Exit Cone Phenolic (CCP) Section Condition	Right	Forward Exit Cone	C-50
C-15	Fixed Housing Phenolic (CCP) Section Condition	Right	Fixed Housing	C-51
C-16	Throat Inlet Assembly Phenolic (CCP) Section Condition	Right	Throat	C-52
C-17	Nose Cap Phenolic (CCP) Section Condition	Right	Nose Cap	C-53
C-18	Forward Nose Ring and Aft Inlet Ring Phenolic (CCP) Section Condition	Right	Forward Nose & Aft Inlet Rings	C-54
N/A	AFT ^{Exit} Cone Assembly Phenolic (CCP) Section Condition on Left		AFT Exit Cone	C-55

(Note: Clarification PFORs will be inserted after the applicable required PFOR in the Final Report and will have the same page number as the required PFOR appended by a sequential alphabetic extension.)

POSTFLIGHT OBSERVATION RECORD (PFOR) C-1
Nozzle Assembly Quick-look Condition

Motor No.: 360L028 Side: ☒ Left (A) ☐ Right (B) Date: 12-14-92

Assessment Engineer(s)/Inspector(s): M.E. CLARK

Nozzle Assembly Quick-look Observations:

	Yes	No	Comment #
A. Metal Damage Due to Transportation or Handling?	<u>✓</u>	<u>✓</u>	<u>1</u>
B. Phenolic Damage Due to Transportation or Handling?	<u>✓</u>	<u>✓</u>	<u>1</u>
C. Foreign Material?	<u>✓</u>	<u>✓</u>	<u>1</u>

Notes / Comments

1) Very minor damage to small portion of FEC phenolic that remains on the aft end. No erosion and char measurements will be taken in these areas. Tie-down chains rubbed through covering.

Preliminary PFAR(s)? Yes ✓ No Preliminary PFAR Number(s): _____

Clarification Form(s)? Yes ✓ No Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2
Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): J. WALKER P. MILLER, M. Clark		
Joint: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)		

Internal Nozzle Joint Observations:

	Yes	No	Comment #
A. Gas Penetration in the RTV (Terminated, Through)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. RTV Not Below Char Line?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. RTV To the Primary O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. RTV Past the Primary O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Uncured RTV?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Voids Within RTV?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Heat Affected or Eroded Virgin CCP, GCP/SCP, or adhesive?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I. Damaged Phenolics?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
J. Bondline Edge Separations? Use Clarification Form.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Phenolics Axially Displaced From Housing?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
L. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M. Unbonded or Blistered Paint?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2
N. Corrosion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
O. Excessive Grease in Threaded Bolt Holes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
P. Bolt Hole Damage (Through, Threaded/Helical Coil Insert)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Q. Bent or Broken Bolts?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
R. Metal Damage (Joints or Housings)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

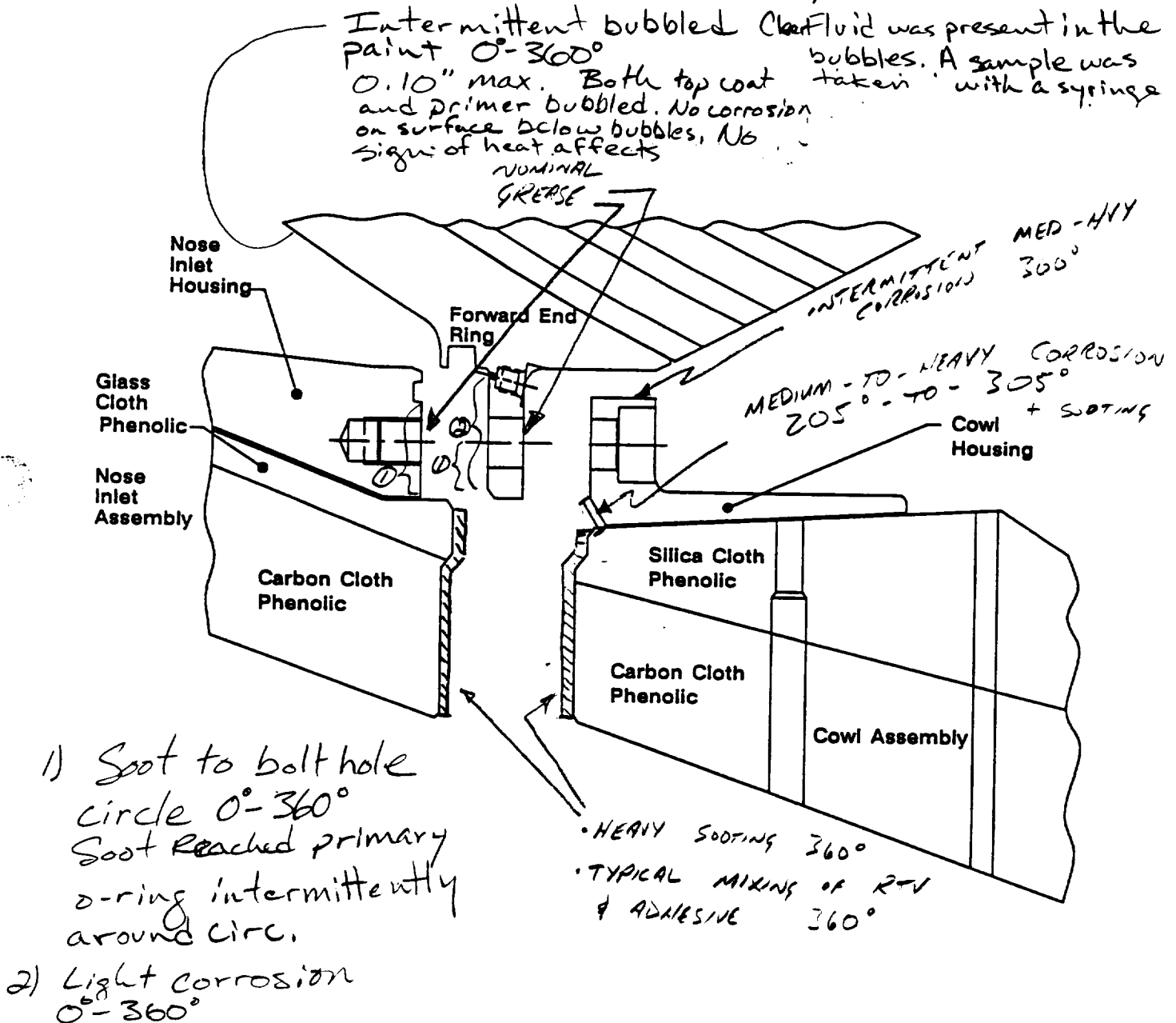
- 1) Light-to-heavy corrosion observed. Reference page C-3 for locations.
- 2) Bubbled paint was observed. Reference page C-3
A preliminary PPAR was written.

Preliminary PPAR(s)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Preliminary PPAR Number(s): 53C-02
Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-3
Nose Inlet-to-Flex Bearing-to-Cowl Joint (Joint #2) Condition Drawing Worksheet

Motor No.: 360T028	Side: Left (A)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): J. WALKER P. MILLER M. Clark		

Sketch Observations Below (include locations and sizes of sketched features):



Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2
Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 12-16-92
Assessment Engineer(s)/Inspector(s): M. E. Clark, P. Miller		
Joint: Nose Inlet-to-Throat (Joint #3)		

Internal Nozzle Joint Observations:

	Yes	No	Comment #
A. Gas Penetration in the RTV (Terminated, Through)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. RTV Not Below Char Line?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. RTV To the Primary O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. RTV Past the Primary O-ring?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Uncured RTV?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
F. Voids Within RTV?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
G. Grease Inhibiting RTV Backfill?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I. Heat Affected or Eroded Virgin CCP, GCP/SCP, or adhesive?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
J. Damaged Phenolics?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
K. Bondline Edge Separations? Use Clarification Form.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
L. Phenolics Axially Displaced From Housing?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M. Heat Affected Metal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
N. Unbonded or Blistered Paint?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2
O. Corrosion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3
P. Alignment Pin Damage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Q. Excessive Grease in Threaded Bolt Holes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
R. Bolt Hole Damage (Through, Threaded/Helical Coil Insert)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
S. Bent or Broken Bolts?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
T. Metal Damage (Joints or Housings)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

- 1) Separations documented on page C-4A
- 2) Bubbled paint observed on O.D. surface of throat flange, Reference page C-5. A preliminary PFAIR was written.
- 3) Corrosion observed. Reference page C-5.

Preliminary PFAIR(s)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Preliminary PFAIR Number(s): 53C-04
Clarification Form(s)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Clarification Form Page No.(s): C-4A

Corresponding Comment Number(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-4
Nose Inlet-to-Throat Joint (Joint #3) Condition Drawing Worksheet

Motor No.: 360T028

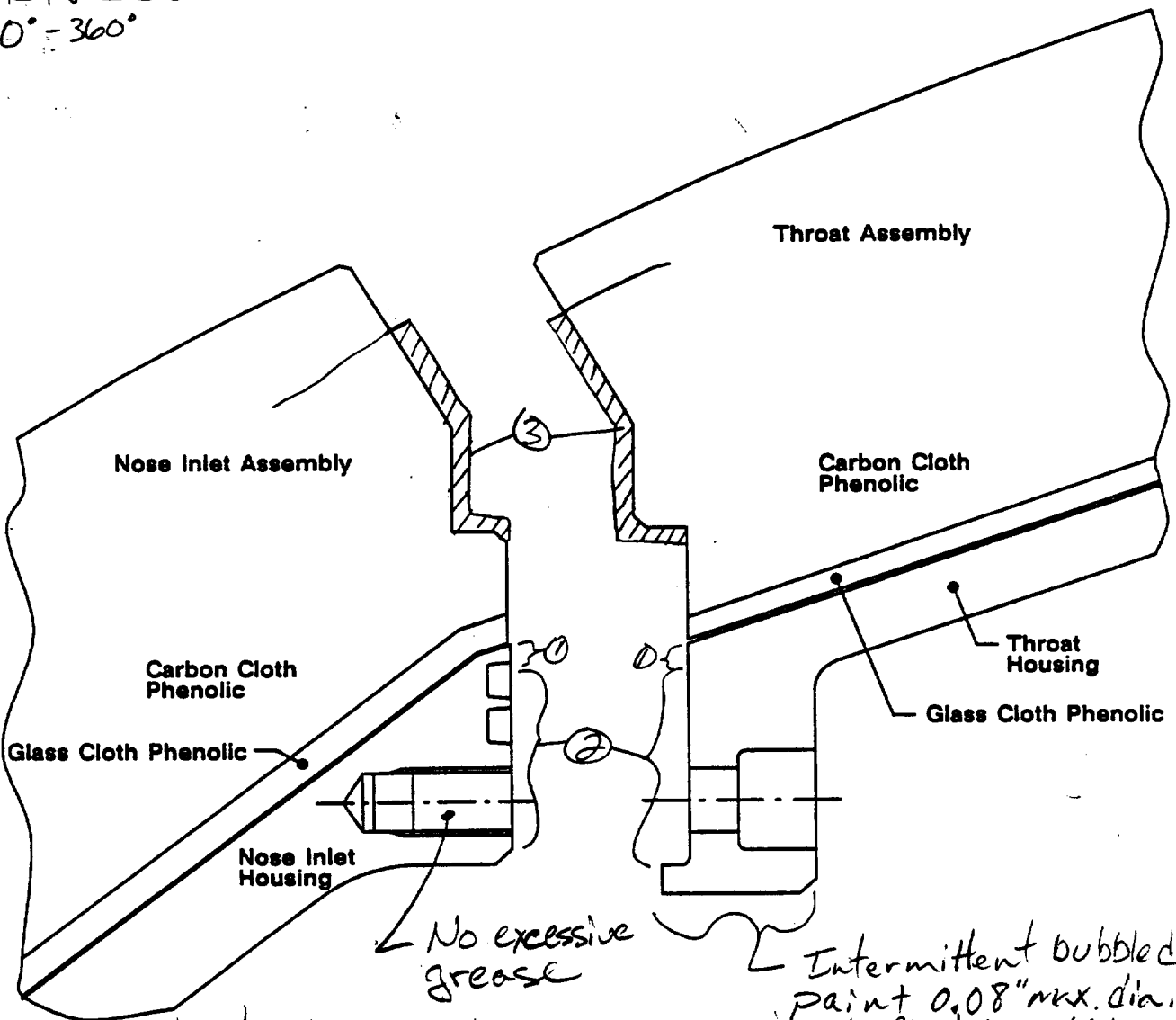
Side: Left (A)

Date: 12-16-92

Assessment Engineer(s)/Inspector(s): M.E. Clark, P. Miller

Sketch Observations Below (include locations and sizes of sketched features):

3) RTV below the char line
0° - 360°



1) Intermittent light-to-medium corrosion around the circ.

2) Nominal grease coverage with no corrosion.

Intermittent bubbled paint 0.08" max. dia. with fluid in bubbles. No corrosion or sign of heat affects. The top coat and primer is bubbled.

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No. (s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2
Internal Nozzle Joint Condition

Motor No.: <u>3606028</u>	Side: <input checked="" type="checkbox"/> Left (A) <input type="checkbox"/> Right (B)	Date: <u>12-15-92</u>
Assessment Engineer(s)/Inspector(s): <u>M.E. Clark</u>		
Joint: <input type="checkbox"/> Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2) <input checked="" type="checkbox"/> Throat-to-Forward Exit Cone (Joint #4) <input type="checkbox"/> Nose Inlet-to-Throat (Joint #3) <input type="checkbox"/> Aft End Ring-to-Fixed Housing (Joint #5)		

Internal Nozzle Joint Observations:

	Yes	No	Comment #
A. Gas Penetration in the RTV (Terminated, Through)?		✓	
B. RTV Not Below Char Line?		✓	
C. RTV To the Primary O-ring?	✓		1
D. RTV Past the Primary O-ring?		✓	
E. Uncured RTV?		✓	
F. Voids Within RTV?		✓	
G. Grease Inhibiting RTV Backfill (Joints 3 and 4)?		✓	
H. Foreign Material?		✓	
I. Heat Affected or Eroded Virgin CCP, GCP/SCP, or adhesive?		✓	
J. Damaged Phenolics?		✓	
K. Bondline Edge Separations? Use Clarification Form.	✓		2
L. Phenolics Axially Displaced From Housing?		✓	
M. Heat Affected Metal?		✓	
N. Unbonded or Blistered Paint?		✓	
O. Corrosion?	✓		3
P. Alignment Pin Damage (Joints 3, 4, and 5)?		✓	
Q. Excessive Grease In Threaded Bolt Holes?		✓	
R. Bolt Hole Damage (Through, Threaded/Helical Coil Insert)?		✓	
S. Bent or Broken Bolts?		✓	
T. Metal Damage (Joints or Housings)?		✓	

Notes / Comments

- 1) RTV reached primary o-ring at 37.5°-165° and 247.5°-347.5°
- 2) Separations documented on pages C-6A and C-6B
- 3) Light-to-medium corrosion observed. Reference page C-7 for locations.

Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Preliminary PFAR Number(s): _____
Clarification Form(s)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Clarification Form Page No.(s): <u>C-6A & C-6B</u>

[illegible]

Corresponding Comment Number(s): _____

Motor No.: 360L028 Side: ☒ Left (A) ☐ Right (B) Date: 12-15-92

Assessment Engineer(s)/Inspector(s): *M. E. Clark*

Interface Separation Types:

***G. Adhesive-to-SCP**

*H. Within SCP

*1. SCP-to-CCP

Maximum Radial Width

0-360

A

0.010"

Corresponding Comment Number(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-5
Throat-to-Forward Exit Cone Joint (Joint #4) Condition Drawing Worksheet

Motor No.: 3601028

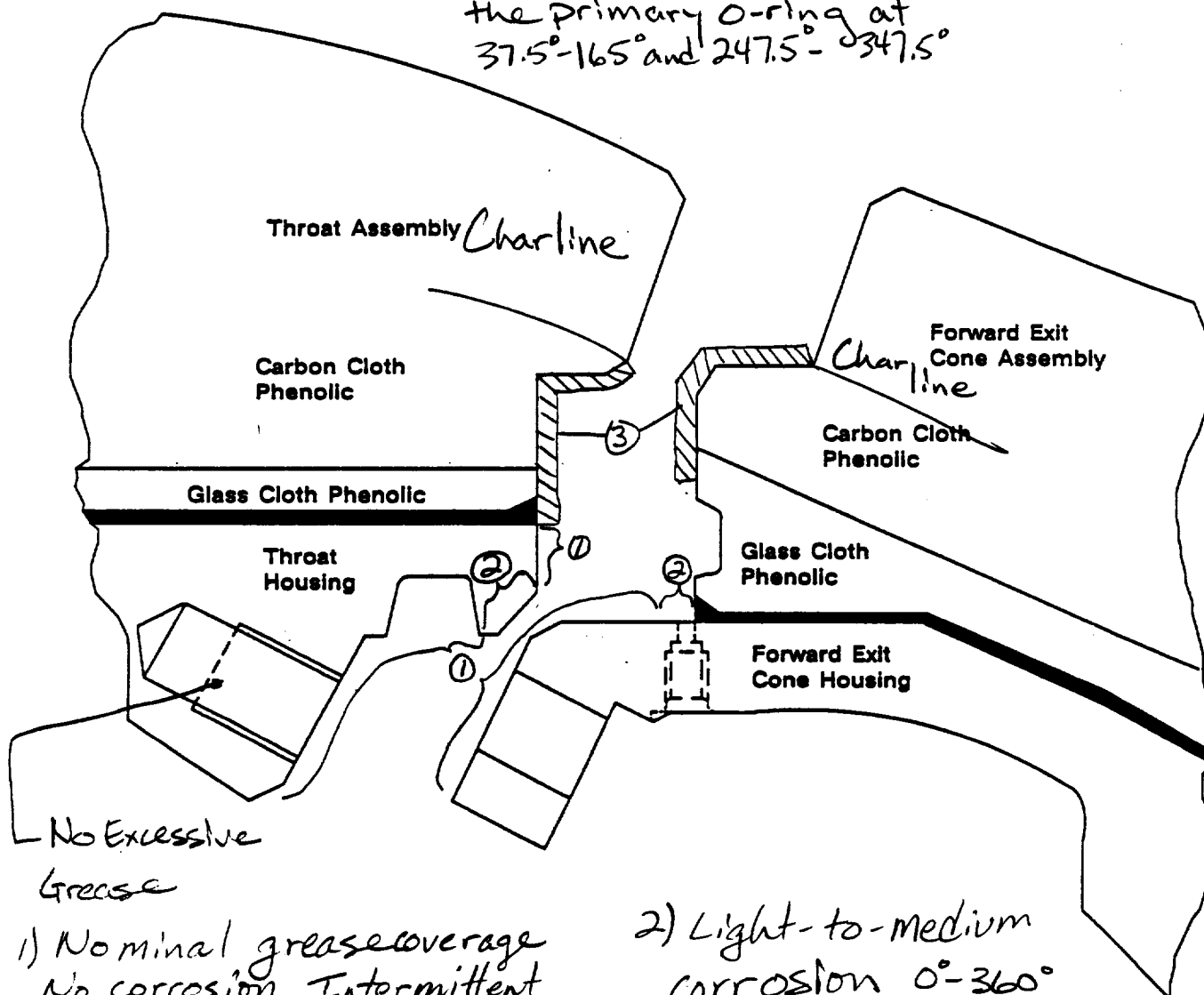
Side: ☒ Left (A) ☐ Right (B)

Date: 12-15-92

Assessment Engineer(s)/Inspector(s): M. E. Clark

Sketch Observations Below (include locations and sizes of sketched features):

3) RTU reached below the Charline 0°-360°. Reached the primary O-ring at 37.5°-165° and 247.5°-347.5°



1) Nominal grease coverage
No corrosion. Intermittent drops of water.

2) Light-to-medium corrosion 0°-360° between the phenolics and secondary O-ring

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2
Internal Nozzle Joint Condition

Motor No.: 360T028

Side: Left (A)

Date: 12-15-92

Assessment Engineer(s)/Inspector(s): M. Clark, J. Passman

Joint: Aft End Ring-to-Fixed Housing (Joint #5)

Internal Nozzle Joint Observations:

	Yes	No	Comment #
A. Gas Penetration in the RTV (Terminated, Through)?		✓	
B. RTV Not Below Char Line?		✓	
C. RTV To the Primary O-ring?	✓		1
D. RTV Past the Primary O-ring?		✓	
E. Uncured RTV?		✓	
F. Voids Within RTV?	✓		2
G. Foreign Material?		✓	
H. Heat Affected or Eroded Virgin CCP, GCP/SCP, or adhesive?		✓	
I. Damaged Phenolics?		✓	
J. Bondline Edge Separations? Use Clarification Form.		✓	
K. Phenolics Axially Displaced From Housing?		✓	
L. Heat Affected Metal?		✓	
M. Unbonded or Blistered Paint?		✓	
N. Corrosion?	✓		3
O. Alignment Pin Damage?		✓	
P. Excessive Grease in Threaded Bolt Holes?		✓	
Q. Bolt Hole Damage (Through, Threaded/Helical Coil Insert)?		✓	
R. Bent or Broken Bolts?		✓	
S. Metal Damage (Joints or Housings)?		✓	

Notes / Comments

- 1) RTV reach primary O-ring at 205°-260° and 20°-85°
- 2) Intermittent voids in the RTV due to assembly process.
- 3) ^{Medium} Corrosion observed on flex bearing. Reference page C-9 for location

Preliminary PFAR(s)? Yes ☒ No ☒

Preliminary PFAR Number(s): _____

Clarification Form(s)? Yes ☒ No ☒

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-6
Aft End Ring-to-Fixed Housing Joint (Joint #5) Condition Drawing Worksheet

Motor No.: 360T028

Side: Left (A)

Date: 12-15-92

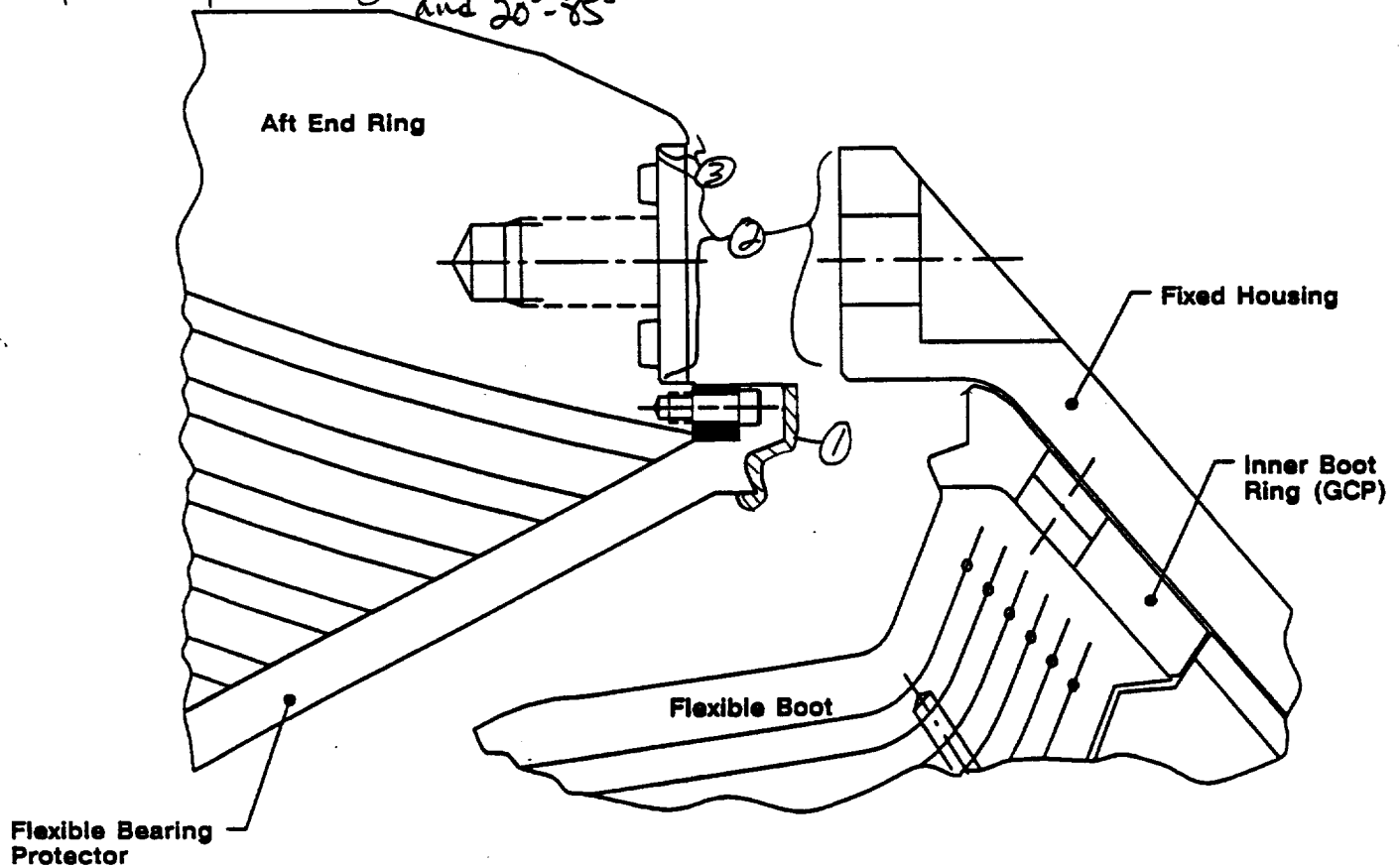
Assessment Engineer(s)/Inspector(s): M. Clark, J. Passman

Sketch Observations Below (include locations and sizes of sketched features):

1) Nominal RTV coverage with intermittent voids due to the assembly process. RTV reached primary O-ring at 205-260° and 20°-85°

2) Nominal grease coverage with no corrosion

3) Intermittent medium corrosion 0°-360°



Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s): _____

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SEC PAGE C-9

POSTFLIGHT OBSERVATION RECORD (PFOR) C-7
Cowl Insulation Segment Condition

Motor No.: 360T028	Side: Left (A)	Date: 12/15/92
--------------------	----------------	----------------

Assessment Engineer(s)/Inspector(s): M.E. Clark, J. Passman, T. WALKER, P. MILLER

Cowl Insulation Segment Observations:

	Yes	No	Comment #
A. Spring Pin Holes Completely Through the Cowl Segment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	3
B. Abnormal Heat Effects or Erosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Soot Between the Cowl Segment and Cowl Housing?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. Bondline Failure Mode? Data Collection Only.	N/A	N/A	2

Notes / Comments

1) bubbles observed on the cowl segment I.D. surface at 90°-170°.

2) BONDLINE FAILURE MODE: 20% COHESIVE WITHIN SEGMENTS
70% ADHESIVE - TO - SEGMENTS
10% ADHESIVE - TO - METAL

3. 17 OF THE Spring Pin-holes were Between .150 - .200 deep

Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Preliminary PFAR Number(s):
Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-8
Flexible Bearing, Flexible Bearing Protector, and Flexible Boot Condition

Motor No.: 360T028	Side: Left (A)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): M.E. Clark, J. Passman		
Flexible Bearing, Bearing Protector, and Boot Observations:		
	Yes	No
A. Bearing Protector Burn-Through?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Cracks Through the Bearing Protector?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Bearing Protector Heat Effects or Erosion Other Than at Cowl Vent Hole Locations?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. Soot Between the Bearing Protector and Flexible Bearing?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
E. Heat Effects to the Flexible Bearing?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
F. Bent or Broken Bearing Protector Bolts?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
G. Flexible Boot Burn-Through?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
H. Abnormal Heat Effects or Erosion to Flexible Boot ID?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
I. Foreign Material in Boot Cavity?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

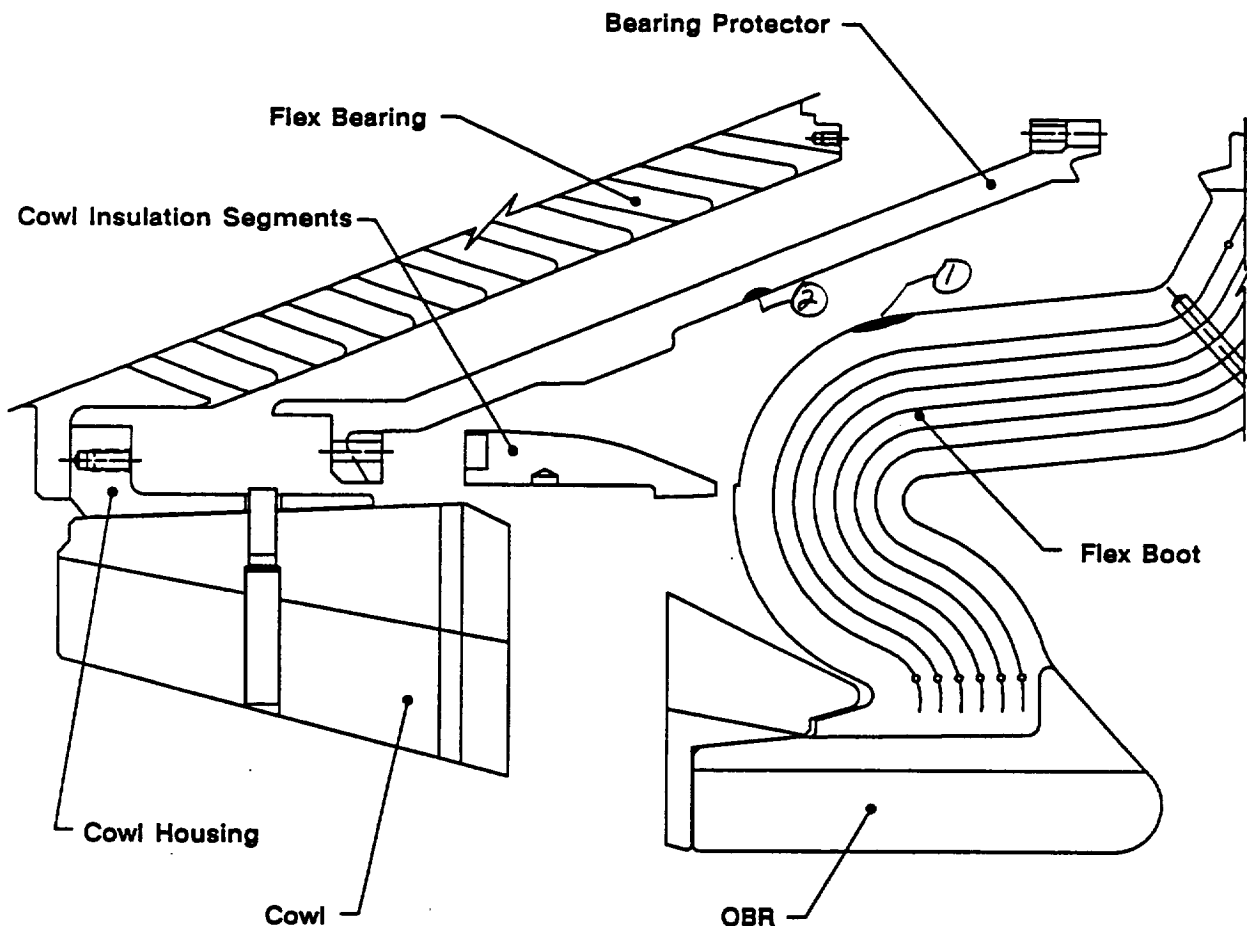
Notes / Comments

1) Erosion on the bearing protector other than the belly band at 150° and 178°-185°. Corresponding areas on flex boot. Appears that slag was trapped between the boot and bearing protector. Slag found in the boot cavity. Preliminary PFAR was written.

Preliminary PFAR(s)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Preliminary PFAR Number(s): 53C-01
Clarification Form(s)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Clarification Form Page No.(s): C-11A

Flexible Boot Cavity Clarification Form

Motor No.: 360T028	Side: <input checked="" type="checkbox"/> Left (A) <input type="checkbox"/> Right (B)	Date: 12-15-92
Assessment Engineer(s)/Inspector(s): M. Clark, S. Passman		
Description: Flex boot cavity conditions, erosion on bearing protector and		
Sketch Observations Below (include locations and sizes of sketched features): flex boot		



- 2) Erosion on bearing protector at:
- a) 150°, 1.8" aft of belly band
1.5" circ. x 1.1" axial
 - b) 178°-195°, 1.8" aft of belly band
5.4" circ. x 1.3" axial

- ① 180° 5.4" circ. x 1.1" axial
150° 1.7" circ. x 1.2" axial
Erosion on flex boot
Appears that slag was trapped between the boot and bearing protector

Corresponding Comment Number(s): _____

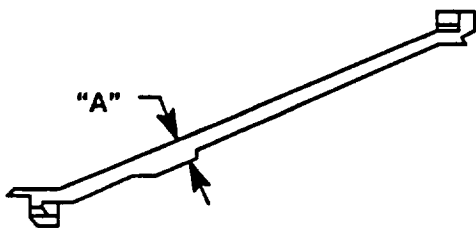
POSTFLIGHT OBSERVATION RECORD (PFOR) C-9
Flexible Bearing Protector Thickness Measurements

Motor No.: 360T028	Side: Left (A)	Date: 12-16-92
---------------------------	-----------------------	-----------------------

Assessment Engineer(s)/Inspector(s): Jed BENSON, R.R. Gallegos

Record the Flexible Bearing Protector Gas Impingement Area Thickness Measurements (see figure) Below:

Degree Location	Thickness Measurement "A"* (Inches)	Degree Location	Thickness Measurement "A"* (Inches)	Degree Location	Thickness Measurement "A"* (Inches)
0	<u>.724"</u>	120	<u>.745"</u>	240	<u>.734"</u>
10	<u>.692"</u>	130	<u>.746"</u>	250	<u>.724"</u>
20	<u>.738"</u>	140	<u>.735"</u>	260	<u>.747"</u>
30	<u>.735"</u>	150	<u>.735"</u>	270	<u>.736"</u>
40	<u>.740"</u>	160	<u>.738"</u>	280	<u>.744"</u>
50	<u>.732"</u>	170	<u>.741"</u>	290	<u>.735"</u>
60	<u>.731"</u>	180	<u>.740"</u>	300	<u>.720"</u>
70	<u>.745"</u>	190	<u>.738"</u>	310	<u>.714"</u>
80	<u>.752"</u>	200	<u>.750"</u>	320	<u>.709"</u>
90	<u>.748"</u>	210	<u>.742"</u>	330	<u>.715"</u>
100	<u>.746"</u>	220	<u>.732"</u>	340	<u>.734"</u>
110	<u>.752"</u>	230	<u>.733"</u>	350	<u>.729"</u>



* "A" is the minimum thickness of the bearing protector in-line with the cowl vent holes. It corresponds to the deepest gas impingement location.

Notes / Comments

None

Preliminary PFAR(s)? ☐ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-10
Throat Diameter Measurements (Data Collection Only)

Motor No.: 360T028	Side: Left (A)	Date: 12-16-92										
Assessment Engineer(s)/Inspector(s): MIGUEL ENRIQUEZ Jr.												
<p>Record the Nozzle Throat Diameter Measurements Below:</p> <table style="margin-left: auto; margin-right: auto;"><thead><tr><th style="text-align: center;">Degree Location</th><th style="text-align: center;">Diameter Measurement (Inches)</th></tr></thead><tbody><tr><td style="text-align: center;">0</td><td style="text-align: center;"><u>55.960"</u></td></tr><tr><td style="text-align: center;">45</td><td style="text-align: center;"><u>55.970"</u></td></tr><tr><td style="text-align: center;">90</td><td style="text-align: center;"><u>55.955"</u></td></tr><tr><td style="text-align: center;">135</td><td style="text-align: center;"><u>55.955"</u></td></tr></tbody></table>			Degree Location	Diameter Measurement (Inches)	0	<u>55.960"</u>	45	<u>55.970"</u>	90	<u>55.955"</u>	135	<u>55.955"</u>
Degree Location	Diameter Measurement (Inches)											
0	<u>55.960"</u>											
45	<u>55.970"</u>											
90	<u>55.955"</u>											
135	<u>55.955"</u>											
Notes / Comments												

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-11
Outer Boot Ring Char and Erosion Measurements and Flexible Boot Condition

Motor No.: 360T028	Side: Left (A)	Date: 5/20/93
--------------------	----------------	---------------

Assessment Engineer(s)/Inspector(s): R. Quick

Flexible Boot/Outer Boot Ring Separation Observations:	Yes	No	Comment #
A. Heat Effects In Boot/OBR Separation?	<u> </u>	<u> ✓ </u>	<u> </u>

Record the Outer Boot Ring Char and Erosion Measurements Below:

Station Location	0°		90°		180°		270°	
	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
8.0	<u>.02</u>	<u>1.07</u>	<u>.08</u>	<u>.93</u>	<u>.02</u>	<u>.95</u>	<u>.02</u>	<u>.85</u>
9.0	<u>.04</u>	<u>.94</u>	<u>.06</u>	<u>.84</u>	<u>.02</u>	<u>.82</u>	<u>.0</u>	<u>.81</u>
10.0	<u>.03</u>	<u>.91</u>	<u>.03</u>	<u>.80</u>	<u>0</u>	<u>.78</u>	<u>.0</u>	<u>.84</u>
11.3	<u>.01</u>	<u>.93</u>	<u>.04</u>	<u>.81</u>	<u>.02</u>	<u>.88</u>	<u>.0</u>	<u>.87</u>

Negative Margin of Safety? Yes ✓ No Station: Degree:

Record the Number of Piles Remaining on the Flexible Boot:

Degree Location	Piles Remaining
0	<u>3.8</u>
90	<u>3.1</u>
180	<u>3.8</u>
270	<u>3.0</u>

Negative Margin of Safety? Yes ✓ No Degree:

Notes / Comments

Special Issue 3.3.9: NO ABNORMAL EROSION WAS OBSERVED

Preliminary PFAR(s)? Yes ✓ No Preliminary PFAR Number(s):

Clarification Form(s)? Yes ✓ No Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028	Side: Left (A)	Date: 1-8-93
--------------------	----------------	--------------

Assessment Engineer(s)/Inspector(s): WILKES / MILLER

Phenolic Subassembly: Aft Exit Cone Assembly

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location						
	0-360						
Metal-to-Adhesive							
Within Adhesive							
Adhesive-to-GCP							
Within GCP	100%						
GCP-to-CCP							
Within CCP							

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

	Degree Location							
	45-135	135-225	225-315	315-360				
Metal-to-Adhesive	5	10	4	6				
Within Adhesive	1	2	1	1				
Adhesive-to-GCP	94	88	95	93				

Phenolic Removal Method: MUCH HAMMER, WEDGE & PEEL (TYPICAL)

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Voids in Adhesive?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
C. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2

Notes / Comments ① SEE PFOR CLARIFICATION FORM PAGE C-15A

② TYPICAL .150 DIA MAX. POLYSULFIDE VOIDS THROUGHOUT LENGTH & CIRCUMFERENCE. UNFILLED VOID INTERMITTENTLY AROUND CIRCUMFERENCE AT AFT .200 MAX EXCEPT ONE "V" SHAPE VOID AT 195° EXTENDED TO .400 MAX FROM AFT END OF GROOVE.

Preliminary PFAIR(s)? ☐ Yes ☒ No Preliminary PFAIR Number(s): _____

Clarification Form(s)? ☒ Yes ☐ No Clarification Form Page No.(s): C-15A

Nozzle Subassembly Bondline Adhesive Void Clarification Form

Motor No.: 360T028	Side: <input checked="" type="checkbox"/> Left (A) <input type="checkbox"/> Right (B)	Date: 1-8-93
Assessment Engineer(s)/Inspector(s): WILKES / MILLER		
Nozzle Subassembly: AFT EXIT CONE ASSEMBLY		

Record Bondline Adhesive Void Measurements and Locations Below:

Degree Location	Void Size		Location on Bonding Surface	
	Axial	Circ.	Distance From Fwd	Distance From Aft
184	1.90	.90	6.40	
183	.70	.60	11.60	
180	.80	.60	15.10	
179	.80	.40	25.40	
89	1.70	.70	27.60	
356	2.90	1.00	8.80	
250	.90	.60	23.50	

Notes / Comments: TYPICALLY VERY FEW SMALL ADHESIVE VOIDS (.500 DIA MAX) WERE OBSERVED AROUND CIRCUMFERENCE.

Corresponding Comment Number(s): 1

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028	Side: Left (A)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): J. WALKER P. MILLER		
Phenolic Subassembly: Forward Exit Cone Assembly		

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location							
	0-90	90-180	180-270	270-360				
Metal-to-Adhesive	10	15	10	10				
Within Adhesive	15	15	15	15				
Adhesive-to-GCP	75	70	75	75				
Within GCP								
GCP-to-CCP								
Within CCP								

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

	Degree Location							
	0-90	90-180	180-270	270-360				
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-GCP								

Phenolic Removal Method: _____

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Voids in Adhesive?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
C. Corrosion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2
D. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

- 1) VOIDS DOCUMENTED ON CLARIFICATION FORM C-16A
- 2) MEDIUM- TO - HEAVY CORROSION ON AREAS OF METAL - TO - ADHESIVE SEPARATION

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☒ Yes ☐ No Clarification Form Page No.(s): C-16A

Nozzle Subassembly Bondline Adhesive Void Clarification Form

Motor No.: 360T028	Side: <input checked="" type="checkbox"/> Left (A) <input type="checkbox"/> Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): J. WALKER P. MILLER		
Nozzle Subassembly: FORWARD EXIT CONE		

Record Bondline Adhesive Void Measurements and Locations Below:

Degree Location	Void Size		Location on Bonding Surface	
	Axial	Circ.	Distance From Fwd	Distance From Aft
17°	.8"	.4"		7.7"
45°	.5"	.3"		10.5"
58°	.7"	.4"		2.7"
77°	1.6"	.5"		12.9"
75°	1.0"	.4"		19.2"
76°	1.1"	.5"		22.9"
78°	1.1"	.5"		8.7"
159°	.5"	.3"		4.3"
352°	.9"	.5"		6.9"
355°	.1"	.8"		8.1"

Notes / Comments

Corresponding Comment Number(s): 1

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028	Side: Left (A)	Date: 12/16/92
Assessment Engineer(s)/Inspector(s): J. WALKER P. MILLER		
Phenolic Subassembly: Throat Assembly		

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location							
	0-45	45-90	90-135	135-180	180-225	225-270	270-315	315-360
Metal-to-Adhesive	100	100	95	95	100	100	97	100
Within Adhesive								
Adhesive-to-GCP			5	5			3	
Within GCP								
GCP-to-CCP								
Within CCP								

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

	Degree Location							
	0-45	45-90	90-135	135-180	180-225	225-270	270-315	315-360
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-GCP								

Phenolic Removal Method: _____

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Voids in Adhesive?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2
C. Corrosion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
D. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

- 1) MEDIUM - TO - HEAVY CORROSION 360° EXCEPT @
ADHESIVE - TO - GCP BONDLINE FAILURE LOCATION.
- 2) SEE PAGE C-17A

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☒ Yes ☐ No Clarification Form Page No.(s): C-17A

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028 Side: Left (A) Date: 1-18-93

Assessment Engineer(s)/Inspector(s): WILKES / DIETHL

Phenolic Subassembly: Aft Inlet/Forward Nose Rings

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location							
	45-135	135-225	225-315	315-45				
Metal-to-Adhesive	100	95	100	100				
Within Adhesive								
Adhesive-to-GCP		5						
Within GCP								
GCP-to-CCP								
Within CCP								

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

NA

	Degree Location							
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-GCP								

Phenolic Removal Method: HAMMER & WEDGE

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?		<input checked="" type="checkbox"/>	
B. Voids in Adhesive?	<input checked="" type="checkbox"/>		1
C. Corrosion?	<input checked="" type="checkbox"/>		2
D. Foreign Material?	<input checked="" type="checkbox"/>		3

Notes / Comments ① SEE PFOR CLARIFICATION FORM PAGE C-18A & NOTE 1.
② TYPICAL MEDIUM TO HEAVY CORROSION OVER 98% OF BONDLINE AREA.
③ A BROWNISH CLEAR TACKY FOREIGN MATERIAL WAS OBSERVED IN AN ADHESIVE VOID ON THE FWD NOSE RING INTERFACE. SEE PFOR CLARIFICATION FORM PAGE C-18A FOR SIZE & LOCATION OF VOID. A PRELIMINARY PFAAR WAS WRITTEN ON THIS CONDITION.

Preliminary PFAAR(s)? ☒ Yes ☐ No Preliminary PFAAR Number(s): 53C-11

Clarification Form(s)? ☒ Yes ☐ No Clarification Form Page No.(s): C-18A

Nozzle Subassembly Bondline Adhesive Void Clarification Form

[illegible]

Corresponding Comment Number(s): 1

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028 Side: Left (A) Date: 1-18-93

Assessment Engineer(s)/Inspector(s): WILKES / DIETL

Phenolic Subassembly: Nose Cap

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location							
	0-360							
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-GCP								
Within GCP	5							
GCP-to-CCP	95							
Within CCP								

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

	Degree Location							
	0-45	45-90	90-135	135-180	180-225	225-270	270-315	315-360
Metal-to-Adhesive	34	15	29	15	29	18	60	16
Within Adhesive	1		1		1		1	
Adhesive-to-GCP	65	85	70	85	70	82	39	84

Phenolic Removal Method: HAMMER, WEDGE & PEEL

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Voids in Adhesive?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
C. Corrosion?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
D. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments ① SEE PFOR CLARIFICATION FORM PAGE C-19A & NOTE 1.

② Special Issues 3.3.5 and 3.3.6: SEE CLARIFICATION FORM PAGE C-19A NOTE 2

③ TYPICAL LIGHT-TO-MEDIUM CORROSION ON FORWARD I.D IN. MAXIMUM INTERMITTENTLY AROUND 75% CIRCUM. AND AFT 3.25 IN. MAX FULL CIRCUM.

Preliminary PFAR(s)? Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? ☒ Yes No

Clarification Form Page No.(s): C-19A

Nozzle Subassembly Bondline Adhesive Void Clarification Form

Motor No.: 360T028	Side: <input checked="" type="checkbox"/> Left (A) <input type="checkbox"/> Right (B)	Date: 1-18-93
Assessment Engineer(s)/Inspector(s): WILKES / DIETHL		
Nozzle Subassembly: NOSE CAP		

Record Bondline Adhesive Void Measurements and Locations Below:

Degree Location	Void Size		Location on Bonding Surface	
	Axial	Circ.	Distance From Fwd METAL-TO-AFT	Distance From Aft
230	.32	.22	1.40	
340	.35	.25	13.80	
* 0°	.32	.35	METAL-TO-FWD 1.05	
* 81°	.28	.18	1.10	
* 295°	.35	.200	1.20	

* NOSE CAP-TO-FWD NOSE RING INTERFACE.

Notes / Comments ① TYPICAL SMALL ADHESIVE VOIDS, 0.30 IN. DIA. MAX, WERE OBSERVED THROUGHOUT BONDLINE.

② ADHESIVE VOIDS OBSERVED AT 0°, 81° & 295° ARE NEAR LDA'S IN DR-40757B AT 0°, 81° AND 300°. THE SIZES DO NOT CORRELATE VERY WELL BUT VOIDS WERE AT CHAR LINE AND MAY HAVE EXTENDED FORWARD BUT EVIDENCE WAS BURNED OFF. THE LDI IN DR-410530 WAS IN THE CHAR & EROSION AREA THEREFORE EVIDENCE WAS BURNED OFF.

Corresponding Comment Number(s): 1 & 2

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028	Side: Left (A)	Date: 12-18-92
--------------------	----------------	----------------

Assessment Engineer(s)/Inspector(s): M. Clark, T. Freston

Phenolic Subassembly: Cowl Assembly

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location							
	31S-45	45-135	135-225	225-315				
Metal-to-Adhesive	100	100	100	100				
Within Adhesive								
Adhesive-to-SCP								
Within SCP								
SCP-to-CCP								
Within CCP								

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

	Degree Location							
	N/A							
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-SCP								

Phenolic Removal Method: _____

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?	<u>✓</u>	<u>✓</u>	
B. Voids in Adhesive?	<u>✓</u>	<u>✓</u>	<u>1</u>
C. Corrosion?	<u>✓</u>	<u>✓</u>	<u>2</u>
D. Foreign Material?	<u>✓</u>	<u>✓</u>	

Notes / Comments

1) Special Issue 3.3.8: 3 of 5 LDIs were found Reference page C-20A for Void locations.
2) Medium-to-heavy corrosion bonding surface

Preliminary PFAR(s)? ✓ Yes ✓ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? ✓ Yes ✓ No

Clarification Form Page No.(s): C-20A

Nozzle Subassembly Bondline Adhesive Void Clarification Form

Motor No.: 360T028	Side: <input checked="" type="checkbox"/> Left (A) <input type="checkbox"/> Right (B)	Date: 12-18-92
Assessment Engineer(s)/Inspector(s): M. Clark, T. Freston		
Nozzle Subassembly: Cowl		

Record Bondline Adhesive Void Measurements and Locations Below:

Degree Location	Void Size		Location on Bonding Surface	
	Axial	Circ. <small>forward center</small>	Distance From Fwd	Distance From Aft
* 240	2.2	3.55, 0.32	0	
* 248	0.96	3.1	0	
* 220	0.62	2.45	0	

Notes / Comments

* 1) Void match LDI that were detected by X-ray

Corresponding Comment Number(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028	Side: Left (A)	Date: 12-17-92
Assessment Engineer(s)/Inspector(s): M. Clark, J. Passman, T. Freston		
Phenolic Subassembly: Fixed Housing Assembly		

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location							
	315-45	45-135	135-225	225-315				total
Metal-to-Adhesive	70	25	20	40				39
Within Adhesive								
Adhesive-to-GCP	10	40	78	30				40
Within GCP	20	35	2	30				21
GCP-to-CCP								
Within CCP								

Metal-to-adhesive separation exceeds 15%
A preliminary PFAR was written.

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

	Degree Location							
	315-45	45-135	135-225	225-315				
Metal-to-Adhesive		5		5				3
Within Adhesive								
Adhesive-to-GCP	100	95	100	95				97

Phenolic Removal Method: _____

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?		<input checked="" type="checkbox"/>	
B. Voids in Adhesive?	<input checked="" type="checkbox"/>		1
C. Corrosion?		<input checked="" type="checkbox"/>	
D. Foreign Material?		<input checked="" type="checkbox"/>	

Notes / Comments

- 1) Voids documented on C-21A
- 2) A dark line was stained on the housing. Reference page C-21B and C-21C
- 3) 4 indications were found by ultrasonics and 2 were found during bondline assessment. Reference C-21D

Preliminary PFAR(s)? ☒ Yes ☐ No

Preliminary PFAR Number(s): SSC-06

Clarification Form(s)? ☒ Yes ☐ No

Clarification Form Page No.(s): C-21A, B, C & D

Nozzle Subassembly Bondline Adhesive Void Clarification Form

Motor No.: 360T028 Side: ☒ Left (A) ☐ Right (B) Date: 12/17/92

Assessment Engineer(s)/Inspector(s): JIM PASSMAN, MARK CLARK, TREVOR FOXSTON

Nozzle Subassembly: FIXED HOUSING

Record Bondline Adhesive Void Measurements and Locations Below:

Degree Location	Void Size		Location on Bonding Surface	
	Axial	Circ.	Distance From Fwd	Distance From Aft
32°	.575	.30	—	.70
110°	.95	.30	—	1.80
128°	.65	.15	10.8	—
130°	1.95	.65	10.5	—
142°	.55	.30	—	2.3
170°	.75	.20	—	5.5
220°	.95	.35	—	1.9
282	.75	.25	—	2.2
345	.65	.30	—	.20

Notes / Comments

INTERMITTENT SMALL VOIDS ~ .30 CIRC x .20 AXIAL.

Corresponding Comment Number(s): 1

General Hardware Clarification Form

Motor No.: 360T028

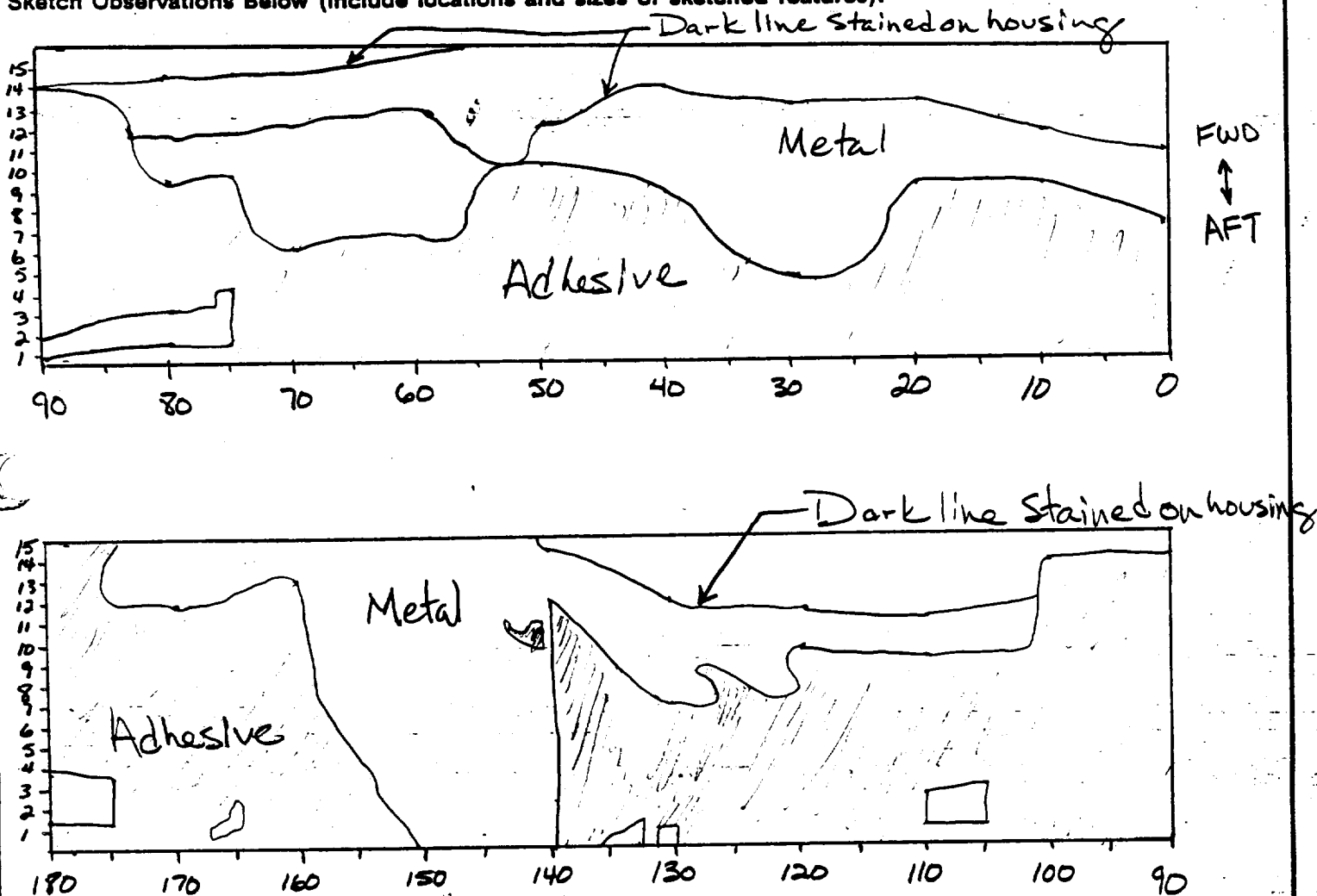
Side: ☒ Left (A) ☐ Right (B)

Date: 12-17-92

Assessment Engineer(s)/Inspector(s): M. Clark, J. Passman, T. Freston

Description: Fixed Housing Bondline Map, Metal Side

Sketch Observations Below (Include locations and sizes of sketched features):

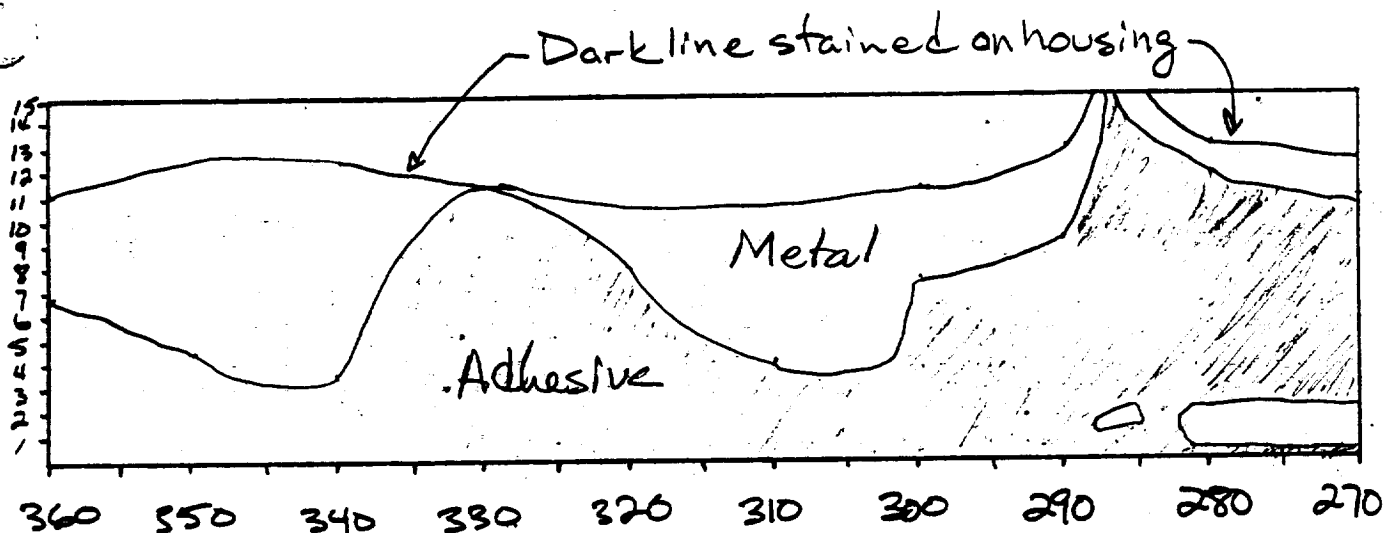
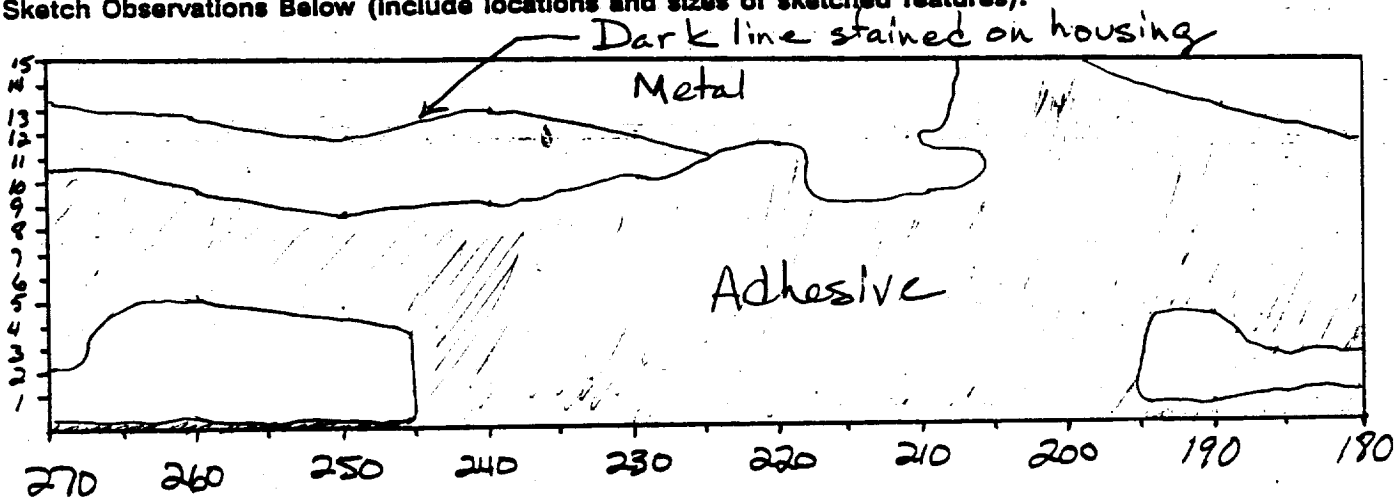


Corresponding Comment Number(s): _____

General Hardware Clarification Form

Motor No.: 360T028	Side: <input checked="" type="checkbox"/> Left (A) <input type="checkbox"/> Right (B)	Date: 12-17-92
Assessment Engineer(s)/Inspector(s): M.E. Clark, J. Passman, T. Freston		
Description: Fixed Housing Bondline Map		

Sketch Observations Below (Include locations and sizes of sketched features):



Corresponding Comment Number(s): _____

General Hardware Clarification Form

Motor No.: 360T028

Side: ☒ Left (A) ☐ Right (B)

Date: 12-17-92

Assessment Engineer(s)/Inspector(s): M. E. Clark, J. Passman, P. Miller

Description: Ultrasonic Indications vs. Bondline Condition.

Sketch Observations Below (Include locations and sizes of sketched features):

Ultrasonic Indications

Bondline Condition

① 75°-95°
5.5"-6.25" aft of fwd end

① Unbond area found with an axial width of 1". Area defined by a dark line stained on the housing.

② 74°-88°
14.5"-15.5" aft of fwd end

② No unbond found

③ 100°-115°
5.5"-6.25" aft of fwd end

③ Area lost during water blasting

④ 130°
11.0" aft of fwd end
1.5" axial x 1.0 circ.

④ An adhesive void was found 10.5" aft of the fwd end at 130°. The void measured 1.95" axial x 0.65" circ.

Corresponding Comment Number(s): _____

REVISION _____

DOC NO.
SEC

TWR-64216

VOL

PAGE C-21d

POSTFLIGHT OBSERVATION RECORD (PFOR) C-13
Cowl Ring Phenolic (CCP) Section Condition

Motor No.: 360T028 Side: Left (A) Date: 5/18/93

Assessment Engineer(s)/Inspector(s): R. Quick

Cowl Phenolic Section Observations:

A. Cross-ply cracking in virgin material?

Yes No
____ ✓ ____
____ ✓ ____

B. Ply lifting?

Record the Cowl Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
0.3	.30	.65	.27	.62	.30	.50	.28	.52
1.0	.36	.63	.29	.64	.35	.51	.31	.55
2.0	.40	.64	.28	.67	.35	.59	.33	.64
3.0	.43	.53	.31	.68	.32	.65	.35	.65
4.0	.44	.55	.31	.63	.32	.66	.35	.66
5.0	.38	.62	.29	.67	.30	.68	.33	.69
6.0	.30	.68	.22	.80	.24	.75	.25	.80
6.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Negative Margin of Safety? ____ Yes ____ ✓ No Station: ____ Degree: ____

Notes / Comments

Preliminary PFAR(s)? ____ Yes ____ ✓ No Preliminary PFAR Number(s): ____

Clarification Form(s)? ____ Yes ____ ✓ No Clarification Form Page No.(s): ____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-14
Forward Exit Cone Phenolic (CCP) Section Condition

Motor No.: 360T028 Side: Left (A) Date: 5/18/93

Assessment Engineer(s)/Inspector(s): R. Quick

Forward Exit Cone Phenolic Section Observations:

	Yes	No	Comment #
A. Cross-ply cracking in virgin material?	<u> </u>	<u>✓</u>	<u> </u>
B. Ply lifting?	<u> </u>	<u>✓</u>	<u> </u>

Record the Forward Exit Cone Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
1.0	<u>.37</u>	<u>.80</u>	<u>.34</u>	<u>.77</u>	<u>.35</u>	<u>.74</u>	<u>.34</u>	<u>.80</u>
4.0	<u>.38</u>	<u>.74</u>	<u>.34</u>	<u>.75</u>	<u>.33</u>	<u>.76</u>	<u>.34</u>	<u>.80</u>
4.6	<u>.36</u>	<u>.74</u>	<u>.34</u>	<u>.76</u>	<u>.35</u>	<u>.73</u>	<u>.34</u>	<u>.80</u>
8.0	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
12.0	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
16.0	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
20.0	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
24.0	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
28.0	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
32.0	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
32.9	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
34.0	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Negative Margin of Safety? Yes ✓ No Station: Degree:

Notes / Comments

Preliminary PFAR(s)? Yes ✓ No Preliminary PFAR Number(s):

Clarification Form(s)? Yes ✓ No Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-15
Fixed Housing Phenolic (CCP) Section Condition

Motor No.: 360T028 Side: Left (A) Date: 5/18/93

Assessment Engineer(s)/Inspector(s): R. Quick

Fixed Housing Phenolic Section Observations:

A. Cross-ply cracking in virgin material?

Yes

No

Comment #

B. Ply lifting?

Record the Fixed Housing Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
0.0	<u>.04</u>	<u>1.13</u>	<u>.06</u>	<u>1.00</u>	<u>0</u>	<u>1.12</u>	<u>.04</u>	<u>1.28</u>
1.0	<u>.02</u>	<u>1.06</u>	<u>.04</u>	<u>.99</u>	<u>.04</u>	<u>.95</u>	<u>.05</u>	<u>1.01</u>
2.0	<u>.03</u>	<u>.93</u>	<u>0</u>	<u>.88</u>	<u>.02</u>	<u>.91</u>	<u>.06</u>	<u>1.01</u>
3.0	<u>.02</u>	<u>.94</u>	<u>0</u>	<u>.87</u>	<u>.03</u>	<u>.89</u>	<u>.03</u>	<u>1.00</u>
4.0	<u>.04</u>	<u>.88</u>	<u>0</u>	<u>.90</u>	<u>0</u>	<u>.91</u>	<u>.03</u>	<u>.94</u>
5.0	<u>.03</u>	<u>.87</u>	<u>0</u>	<u>.93</u>	<u>0</u>	<u>.89</u>	<u>.02</u>	<u>.93</u>
6.0	<u>0</u>	<u>.87</u>	<u>0</u>	<u>.85</u>	<u>0</u>	<u>.85</u>	<u>0</u>	<u>.90</u>
7.0	<u>0</u>	<u>.88</u>	<u>0</u>	<u>.85</u>	<u>0</u>	<u>.86</u>	<u>0</u>	<u>.88</u>
8.0	<u>0</u>	<u>.81</u>	<u>0</u>	<u>.77</u>	<u>0</u>	<u>.75</u>	<u>0</u>	<u>.73</u>
9.0	<u>0</u>	<u>.72</u>	<u>N/A</u>	<u>N/A</u>	<u>0</u>	<u>.68</u>	<u>0</u>	<u>.64</u>
10.75	<u>0</u>	<u>1.84</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>.18</u>	<u>1.46</u>

Negative Margin of Safety?

Yes

No

Station:

Degree:

Notes / Comments

Preliminary PFAR(s)?

Yes

No

Preliminary PFAR Number(s):

Clarification Form(s)?

Yes

No

Clarification Form Page No. (s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-16
Throat Inlet Assembly Phenolic (CCP) Section Condition

Motor No.: 360T028	Side: Left (A)	Date: 5/19/93
Assessment Engineer(s)/Inspector(s): <u>R. Quick</u>		

Throat Inlet Assembly Phenolic Section Observations:

	Yes	No	Comment #
A. Cross-ply cracking in virgin material?	<u> </u>	<u> ✓ </u>	<u> </u>
B. Ply lifting?	<u> </u>	<u> ✓ </u>	<u> </u>

Record the Throat Inlet Ring and Throat Ring Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
1.0	<u>1.04</u>	<u>.54</u>	<u>1.01</u>	<u>.47</u>	<u>1.02</u>	<u>.47</u>	<u>1.05</u>	<u>.47</u>
2.0	<u>1.15</u>	<u>.53</u>	<u>1.03</u>	<u>.52</u>	<u>1.05</u>	<u>.48</u>	<u>1.05</u>	<u>.49</u>
4.0	<u>1.12</u>	<u>.50</u>	<u>1.09</u>	<u>.54</u>	<u>1.11</u>	<u>.46</u>	<u>1.12</u>	<u>.52</u>
6.0	<u>1.17</u>	<u>.51</u>	<u>1.13</u>	<u>.56</u>	<u>1.12</u>	<u>.52</u>	<u>1.16</u>	<u>.55</u>
8.0	<u>1.21</u>	<u>.50</u>	<u>1.21</u>	<u>.48</u>	<u>1.17</u>	<u>.46</u>	<u>1.20</u>	<u>.58</u>
10.0	<u>1.22</u>	<u>.41</u>	<u>1.18</u>	<u>.47</u>	<u>1.17</u>	<u>.40</u>	<u>1.18</u>	<u>.44</u>
12.0	<u>1.19</u>	<u>.37</u>	<u>1.12</u>	<u>.44</u>	<u>1.17</u>	<u>.36</u>	<u>1.17</u>	<u>.47</u>
14.0	<u>1.16</u>	<u>.47</u>	<u>1.13</u>	<u>.42</u>	<u>1.14</u>	<u>.37</u>	<u>1.13</u>	<u>.47</u>
16.0	<u>1.08</u>	<u>.55</u>	<u>1.07</u>	<u>.42</u>	<u>1.09</u>	<u>.44</u>	<u>1.08</u>	<u>.49</u>
18.0	<u>1.07</u>	<u>.58</u>	<u>.93</u>	<u>.52</u>	<u>.92</u>	<u>.59</u>	<u>.93</u>	<u>.51</u>
20.0	<u>.78</u>	<u>.61</u>	<u>.73</u>	<u>.55</u>	<u>.68</u>	<u>.64</u>	<u>.85</u>	<u>.56</u>
22.0	<u>.51</u>	<u>.62</u>	<u>.48</u>	<u>.62</u>	<u>.44</u>	<u>.67</u>	<u>.53</u>	<u>.56</u>
23.0	<u>.39</u>	<u>.69</u>	<u>.40</u>	<u>.71</u>	<u>.36</u>	<u>.73</u>	<u>.39</u>	<u>.70</u>

Negative Margin of Safety? Yes ✓ No Station: Degree:

Notes / Comments

Preliminary PFAR(s)? Yes ✓ No Preliminary PFAR Number(s):

Clarification Form(s)? Yes ✓ No Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-17

Nose Cap Phenolic (CCP) Section Condition

Motor No.: 360T028	Side: Left (A)	Date: 5/20/93
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Assessment Engineer(s)/Inspector(s): E. QUICK

Nose Cap Phenolic Section Observations:

	Yes	No	Comment #
A. Cross-ply cracking in virgin material?	<u> </u>	<u> ✓ </u>	<u> </u>
B. Ply lifting?	<u> </u>	<u> ✓ </u>	<u> </u>

Record the Nose Cap Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
1.5	<u>N/A</u>	<u>N/A</u>	<u>.29</u>	<u>.62</u>	<u>.31</u>	<u>.62</u>	<u>.31</u>	<u>.60</u>
4.0	<u>.41</u>	<u>.58</u>	<u>.36</u>	<u>.52</u>	<u>.36</u>	<u>.55</u>	<u>.41</u>	<u>.55</u>
6.0	<u>.47</u>	<u>.54</u>	<u>.40</u>	<u>.57</u>	<u>.39</u>	<u>.53</u>	<u>.43</u>	<u>.54</u>
8.0	<u>.52</u>	<u>.49</u>	<u>.46</u>	<u>.54</u>	<u>.47</u>	<u>.48</u>	<u>.48</u>	<u>.50</u>
10.0	<u>.57</u>	<u>.52</u>	<u>.48</u>	<u>.56</u>	<u>.48</u>	<u>.47</u>	<u>.54</u>	<u>.48</u>
12.0	<u>.59</u>	<u>.52</u>	<u>.54</u>	<u>.50</u>	<u>.58</u>	<u>.43</u>	<u>.59</u>	<u>.46</u>
14.0	<u>.71</u>	<u>.47</u>	<u>.59</u>	<u>.47</u>	<u>.62</u>	<u>.44</u>	<u>.59</u>	<u>.52</u>
16.0	<u>.79</u>	<u>.48</u>	<u>.67</u>	<u>.48</u>	<u>.71</u>	<u>.39</u>	<u>.74</u>	<u>.42</u>
18.0	<u>.90</u>	<u>.46</u>	<u>.78</u>	<u>.46</u>	<u>.78</u>	<u>.42</u>	<u>.85</u>	<u>.46</u>
20.0	<u>1.13</u>	<u>.50</u>	<u>.97</u>	<u>.42</u>	<u>.96</u>	<u>.41</u>	<u>1.06</u>	<u>.46</u>
22.0	<u>1.79</u>	<u>.68</u>	<u>1.49</u>	<u>.61</u>	<u>1.39</u>	<u>.69</u>	<u>1.55</u>	<u>.67</u>
24.0	<u>1.97</u>	<u>.68</u>	<u>1.73</u>	<u>.67</u>	<u>1.63</u>	<u>.67</u>	<u>1.75</u>	<u>.71</u>
26.0	<u>1.42</u>	<u>.74</u>	<u>1.21</u>	<u>.70</u>	<u>1.10</u>	<u>.73</u>	<u>1.23</u>	<u>.74</u>

Negative Margin of Safety? Yes ✓ No Station: Degree:

Notes / Comments

Preliminary PFAR(s)? Yes ✓ No Preliminary PFAR Number(s):

Clarification Form(s)? Yes ✓ No Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-18
Forward Nose Ring and Aft Inlet Ring Phenolic (CCP) Section Condition

Motor No.: 360T028	Side: Left (A)	Date: 5/20/93
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Assessment Engineer(s)/Inspector(s): E. Quick

Forward Nose and Aft Inlet Ring Phenolic Section Observations:

	Yes	No	Comment #
A. Cross-ply cracking in virgin material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Ply lifting?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Record the Forward Nose Ring (-503) Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
28.0	<u>1.27</u>	<u>.69</u>	<u>1.11</u>	<u>.63</u>	<u>1.07</u>	<u>.69</u>	<u>1.12</u>	<u>.66</u>
30.0	<u>.99</u>	<u>.71</u>	<u>.91</u>	<u>.71</u>	<u>.90</u>	<u>.69</u>	<u>.97</u>	<u>.69</u>
32.0	<u>.91</u>	<u>.64</u>	<u>.91</u>	<u>.55</u>	<u>.93</u>	<u>.63</u>	<u>.95</u>	<u>.63</u>

Negative Margin of Safety? ☐ Yes ☐ No Station: _____ Degree: _____

Record the Aft Inlet Ring Char (-504) and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
34.0	<u>.88</u>	<u>.55</u>	<u>.87</u>	<u>.60</u>	<u>.84</u>	<u>.55</u>	<u>.88</u>	<u>.56</u>
36.0	<u>.91</u>	<u>.60</u>	<u>.89</u>	<u>.63</u>	<u>.86</u>	<u>.58</u>	<u>.92</u>	<u>.60</u>
38.0	<u>1.03</u>	<u>.56</u>	<u>.99</u>	<u>.59</u>	<u>.93</u>	<u>.58</u>	<u>1.02</u>	<u>.65</u>
39.0	<u>1.05</u>	<u>.60</u>	<u>1.02</u>	<u>.61</u>	<u>.97</u>	<u>.61</u>	<u>1.08</u>	<u>.65</u>

Negative Margin of Safety? ☐ Yes ☒ No Station: _____ Degree: _____

Notes / Comments

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-1
Nozzle Assembly Quick-look Condition

Motor No.: 3602028 Side: ☐ Left (A) ☒ Right (B) Date: 12-14-92

Assessment Engineer(s)/Inspector(s): M.E. CLARK

Nozzle Assembly Quick-look Observations:

	Yes	No	Comment #
A. Metal Damage Due to Transportation or Handling?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>1</u>
B. Phenolic Damage Due to Transportation or Handling?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>1</u>
C. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>1</u>

Notes / Comments

1) Very minor damage to small portion of FEC phenolic that remains on aft end. No erosion and char measurements will be taken in these areas. Tie-down chains rubbed through covering.

Preliminary PFAR(s)? ☐ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2
Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): J. WALKER P. MILLER		
Joint: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)		

Internal Nozzle Joint Observations:

	Yes	No	Comment #
A. Gas Penetration in the RTV (Terminated, Through)?		<input checked="" type="checkbox"/>	
B. RTV Not Below Char Line?		<input checked="" type="checkbox"/>	
C. RTV To the Primary O-ring?		<input checked="" type="checkbox"/>	
D. RTV Past the Primary O-ring?		<input checked="" type="checkbox"/>	
E. Uncured RTV?		<input checked="" type="checkbox"/>	
F. Voids Within RTV?		<input checked="" type="checkbox"/>	
G. Foreign Material?		<input checked="" type="checkbox"/>	
H. Heat Affected or Eroded Virgin CCP, GCP/SCP, or adhesive?		<input checked="" type="checkbox"/>	
I. Damaged Phenolics?		<input checked="" type="checkbox"/>	
J. Bondline Edge Separations? Use Clarification Form.		<input checked="" type="checkbox"/>	
K. Phenolics Axially Displaced From Housing?		<input checked="" type="checkbox"/>	
L. Heat Affected Metal?		<input checked="" type="checkbox"/>	
M. Unbonded or Blistered Paint?	<input checked="" type="checkbox"/>		2
N. Corrosion?	<input checked="" type="checkbox"/>		1
O. Excessive Grease in Threaded Bolt Holes?		<input checked="" type="checkbox"/>	
P. Bolt Hole Damage (Through, Threaded/Helical Coil Insert)?		<input checked="" type="checkbox"/>	
Q. Bent or Broken Bolts?		<input checked="" type="checkbox"/>	
R. Metal Damage (Joints or Housings)?		<input checked="" type="checkbox"/>	

Notes / Comments

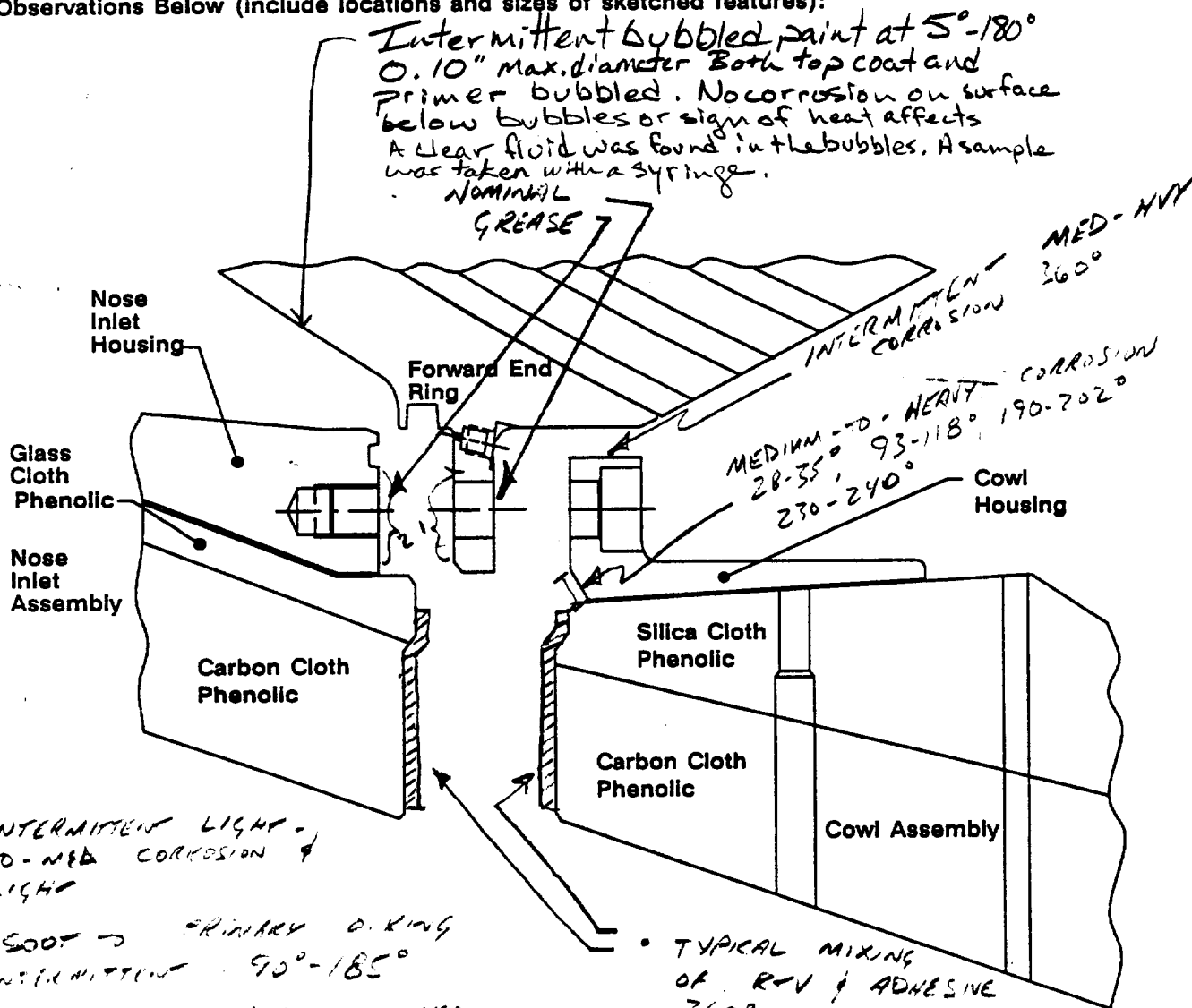
- 1) CORROSION PRESENT & NOTED ON PAGE C-30
- 2) INTERMITTENT BUBBLED PAINT ON FLEX BEARING FORWARD END RING O.D. AT VARIOUS AXIAL POSITIONS AROUND FULL CIRCUMFERENCE. MORE NUMEROUS AND SMALLER BUBBLES PRESENT ON FORWARD MOST REGION
Bubbles present at 5°-to-95°. A preliminary PFAR was written.

Preliminary PFAR(s)?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Preliminary PFAR Number(s): 53C-03
Clarification Form(s)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-3
Nose Inlet-to-Flex Bearing-to-Cowl Joint (Joint #2) Condition Drawing Worksheet

Motor No.: 360T028	Side: Right (B)	Date: 12/15/72
Assessment Engineer(s)/Inspector(s): J. Walker P. Miller, M. Clark		

Sketch Observations Below (include locations and sizes of sketched features):



- 1) INTERMITTENT LIGHT-TO-MED CORROSION & LIGHT
- 2) SOOT - PRIMARY D.R. KING INTERMITTENT 90°-185°
- INTERMITTENT LIGHT-TO-MEDIUM CORROSION 360°

- TYPICAL MIXING OF R-V & ADHESIVE 360°
- HEAVY SOOTING 45°-210°
- LIGHT-TO-MEDIUM SOOTING 210°-0°-45°

ORIGINAL PAGE IS
OF POOR QUALITY

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2
Internal Nozzle Joint Condition

Motor No.: 360T028	Slide: Right (B)	Date: 12-16-92
Assessment Engineer(s)/Inspector(s): M.E. Clark, P. Miller		
Joint: Nose Inlet-to-Throat (Joint #3)		

Internal Nozzle Joint Observations:	Yes	No	Comment #
A. Gas Penetration in the RTV (Terminated, Through)?		<input checked="" type="checkbox"/>	
B. RTV Not Below Char Line?		<input checked="" type="checkbox"/>	
C. RTV To the Primary O-ring?		<input checked="" type="checkbox"/>	
D. RTV Past the Primary O-ring?		<input checked="" type="checkbox"/>	
E. Uncured RTV?		<input checked="" type="checkbox"/>	
F. Voids Within RTV?		<input checked="" type="checkbox"/>	
G. Grease Inhibiting RTV Backfill?		<input checked="" type="checkbox"/>	
H. Foreign Material?		<input checked="" type="checkbox"/>	
I. Heat Affected or Eroded Virgin CCP, GCP/SCP, or adhesive?		<input checked="" type="checkbox"/>	
J. Damaged Phenolics?		<input checked="" type="checkbox"/>	
K. Bondline Edge Separations? Use Clarification Form.	<input checked="" type="checkbox"/>		1
L. Phenolics Axially Displaced From Housing?		<input checked="" type="checkbox"/>	
M. Heat Affected Metal?		<input checked="" type="checkbox"/>	
N. Unbonded or Blistered Paint?	<input checked="" type="checkbox"/>		2
O. Corrosion?	<input checked="" type="checkbox"/>		3
P. Alignment Pin Damage?		<input checked="" type="checkbox"/>	
Q. Excessive Grease in Threaded Bolt Holes?		<input checked="" type="checkbox"/>	
R. Bolt Hole Damage (Through, Threaded/Helical Coil Insert)?		<input checked="" type="checkbox"/>	
S. Bent or Broken Bolts?		<input checked="" type="checkbox"/>	
T. Metal Damage (Joints or Housings)?		<input checked="" type="checkbox"/>	

Notes / Comments

1) Separations documented on page C-31A

2) Bubbled paint observed on O.D. surface of throat flange. Reference C-32. A preliminary PFAR was written.

3) Corrosion observed. Reference page C-32.

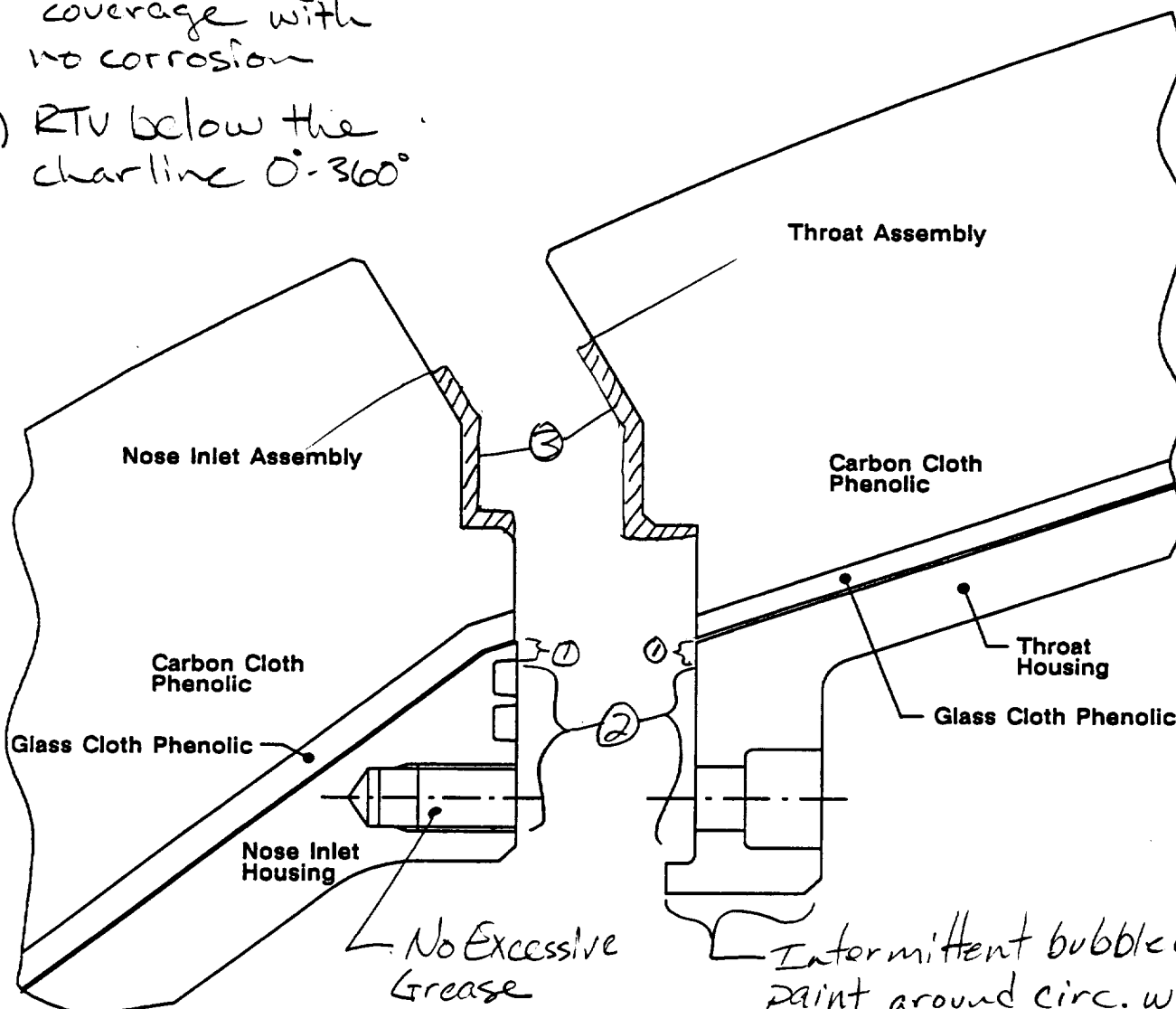
Preliminary PFAR(s)?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Preliminary PFAR Number(s): 53C-05
Clarification Form(s)?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Clarification Form Page No.(s): C-31A

Date: 12-16-97

Assessment Engineer(s)/Inspector(s): M.E. Clark, P. Miller

2) Nominal grease coverage with no corrosion

3) RTV below the char line $0-360^\circ$



Intermittent
1) Light-to-medium
corrosion around the
fire.

— Intermittent bubbled paint around circ. with a max. dia. of 0.05" No Fluid in bubbles, corrosion or sign of heat affects observed.

Clarification Form Page No.(s):

DOC NO.	TWR-64216	VOL
SEC	PAGE	C 22

PAGE C-32

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2
Internal Nozzle Joint Condition

Motor No.: <u>362L028</u>	Side: <input type="checkbox"/> Left (A) <input checked="" type="checkbox"/> Right (B)	Date: <u>12-15-92</u>
Assessment Engineer(s)/Inspector(s): <u>M.E. Clark</u>		
Joint: <input type="checkbox"/> Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2) <input checked="" type="checkbox"/> Throat-to-Forward Exit Cone (Joint #4) <input type="checkbox"/> Nose Inlet-to-Throat (Joint #3) <input type="checkbox"/> Aft End Ring-to-Fixed Housing (Joint #5)		

Internal Nozzle Joint Observations:

- | | Yes | No | Comment # |
|--|-------------------------------------|-------------------------------------|-----------|
| A. Gas Penetration in the RTV (Terminated, Through)? | _____ | <input checked="" type="checkbox"/> | _____ |
| B. RTV Not Below Char Line? | _____ | <input checked="" type="checkbox"/> | _____ |
| C. RTV To the Primary O-ring? | <input checked="" type="checkbox"/> | _____ | <u>1</u> |
| D. RTV Past the Primary O-ring? | _____ | <input checked="" type="checkbox"/> | _____ |
| E. Uncured RTV? | _____ | <input checked="" type="checkbox"/> | _____ |
| F. Voids Within RTV? | _____ | <input checked="" type="checkbox"/> | _____ |
| G. Grease Inhibiting RTV Backfill (Joints 3 and 4)? | _____ | <input checked="" type="checkbox"/> | _____ |
| H. Foreign Material? | _____ | <input checked="" type="checkbox"/> | _____ |
| I. Heat Affected or Eroded Virgin CCP, GCP/SCP, or adhesive? | _____ | <input checked="" type="checkbox"/> | _____ |
| J. Damaged Phenolics? | _____ | <input checked="" type="checkbox"/> | _____ |
| K. Bondline Edge Separations? Use Clarification Form. | <input checked="" type="checkbox"/> | _____ | <u>2</u> |
| L. Phenolics Axially Displaced From Housing? | _____ | <input checked="" type="checkbox"/> | _____ |
| M. Heat Affected Metal? | _____ | <input checked="" type="checkbox"/> | _____ |
| N. Unbonded or Blistered Paint? | _____ | <input checked="" type="checkbox"/> | _____ |
| O. Corrosion? | <input checked="" type="checkbox"/> | _____ | <u>3</u> |
| P. Alignment Pin Damage (Joints 3, 4, and 5)? | _____ | <input checked="" type="checkbox"/> | _____ |
| Q. Excessive Grease In Threaded Bolt Holes? | _____ | <input checked="" type="checkbox"/> | _____ |
| R. Bolt Hole Damage (Through, Threaded/Helical Coll Insert)? | _____ | <input checked="" type="checkbox"/> | _____ |
| S. Bent or Broken Bolts? | _____ | <input checked="" type="checkbox"/> | _____ |
| T. Metal Damage (Joints or Housings)? | _____ | <input checked="" type="checkbox"/> | _____ |

Notes / Comments

- 1) RTV reached the primary o-ring at 105° - 362.5°
- 2) Separations documented on pages C-33A and C-33B
- 3) Light - to - medium corrosion observed. Reference page C-34 for locations.

Preliminary PFAR(s)? _____ Yes ☒ No

Preliminary PFAR Number(s): _____

Clarification Form(s)? ☒ Yes _____ No

Clarification Form Page No.(s): C-33A & C-33B

Motor No.: 3606028	Side: <input type="checkbox"/> Left (A) <input checked="" type="checkbox"/> Right (B)	Date: 12-15-92
--------------------	---	----------------

Assessment Engineer(s)/Inspector(s): M.E. Clark

Part: ☒ Forward Exit Cone (Forward End) ☐ Nose Cap (Aft End)
☐ Throat Ring (Aft End) ☐ Cowl (Forward End)*
☐ Throat Inlet Ring (Forward End) ☐ Inner Boot Ring (Forward End)
☐ Aft Inlet Ring (Aft End)

*1. SCP-to-CCP

Maximum Radial Width

200-310

A

0.040"

Corresponding Comment Number(s): _____

[illegible]

Corresponding Comment Number(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-5
Throat-to-Forward Exit Cone Joint (Joint #4) Condition Drawing Worksheet

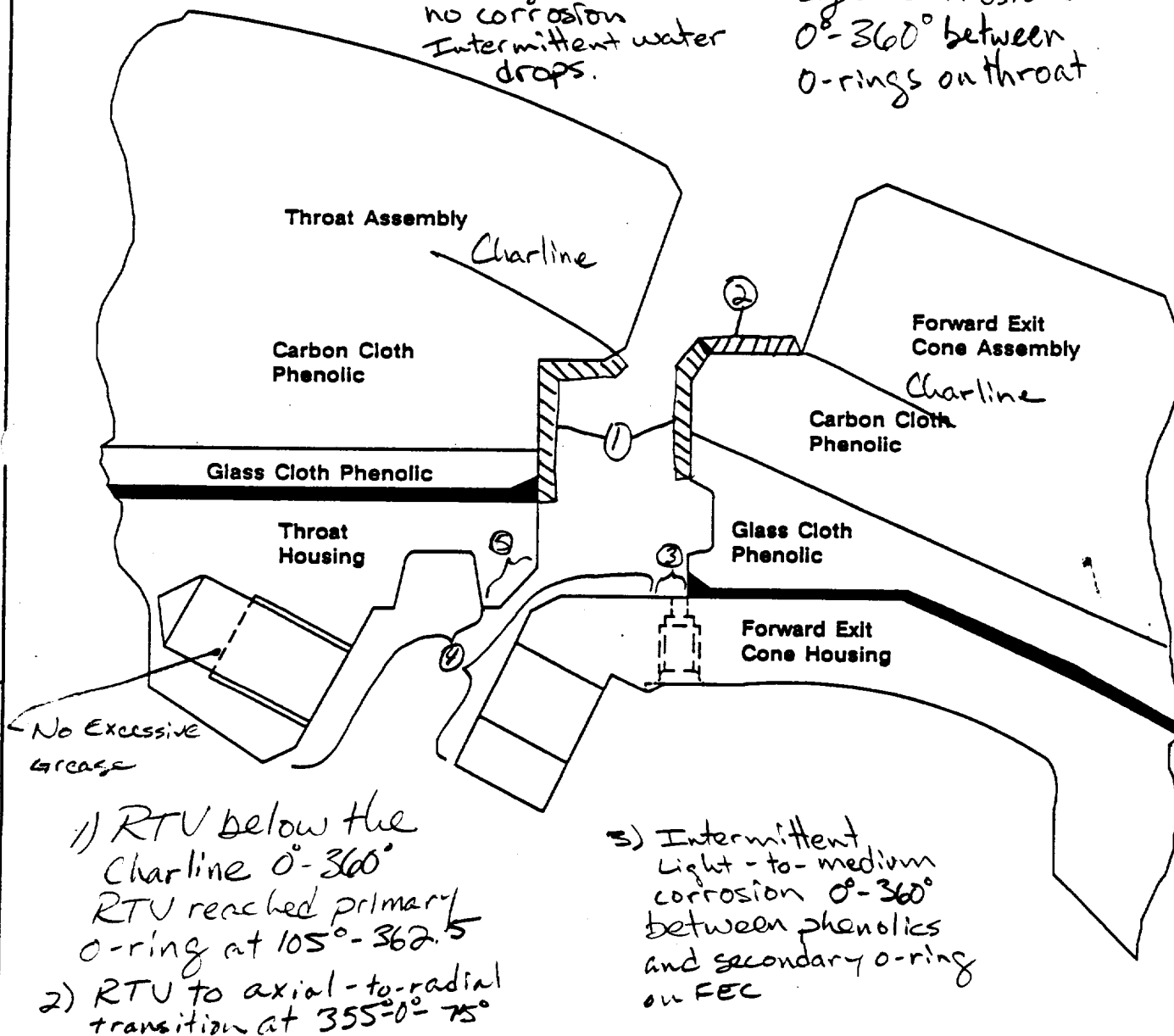
Motor No.: 360L028 Side: ☐ Left (A) ☒ Right (B) Date: 12-15-92

Assessment Engineer(s)/Inspector(s): M.E. Clark

Sketch Observations Below (include locations and sizes of sketched features):

4) Nominal grease coverage with no corrosion
Intermittent water drops.

5) Intermittent light corrosion
0°-360° between O-rings on throat



Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No. (s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2
Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): M. Clark, J. Passman		
Joint: Aft End Ring-to-Fixed Housing (Joint #5)		

Internal Nozzle Joint Observations:

	Yes	No	Comment #
A. Gas Penetration in the RTV (Terminated, Through)?		<input checked="" type="checkbox"/>	
B. RTV Not Below Char Line?		<input checked="" type="checkbox"/>	
C. RTV To the Primary O-ring?	<input checked="" type="checkbox"/>		①
D. RTV Past the Primary O-ring?		<input checked="" type="checkbox"/>	
E. Uncured RTV?		<input checked="" type="checkbox"/>	
F. Voids Within RTV?	<input checked="" type="checkbox"/>		②
G. Foreign Material?		<input checked="" type="checkbox"/>	
H. Heat Affected or Eroded Virgin CCP, GCP/SCP, or adhesive?		<input checked="" type="checkbox"/>	
I. Damaged Phenolics?		<input checked="" type="checkbox"/>	
J. Bondline Edge Separations? Use Clarification Form.		<input checked="" type="checkbox"/>	
K. Phenolics Axially Displaced From Housing?		<input checked="" type="checkbox"/>	
L. Heat Affected Metal?		<input checked="" type="checkbox"/>	
M. Unbonded or Blistered Paint?		<input checked="" type="checkbox"/>	
N. Corrosion?	<input checked="" type="checkbox"/>		③
O. Alignment Pin Damage?		<input checked="" type="checkbox"/>	
P. Excessive Grease in Threaded Bolt Holes?		<input checked="" type="checkbox"/>	
Q. Bolt Hole Damage (Through, Threaded/Helical Coil Insert)?		<input checked="" type="checkbox"/>	
R. Bent or Broken Bolts?		<input checked="" type="checkbox"/>	
S. Metal Damage (Joints or Housings)?		<input checked="" type="checkbox"/>	

Notes / Comments

- ① RTV REACHED PRIMARY O-RING AT 170°-195° AND 335°-0°-8°.
- ② INTERMITTENT VOIDS IN THE RTV FROM ASSEMBLY.
- ③ MEDIUM CORROSION ON FLEX BEARING AFT END RING; INTERMITTENT, (REFERENCE C-35).

Preliminary PFAR(s)?	Yes	<input checked="" type="checkbox"/> No	Preliminary PFAR Number(s):
Clarification Form(s)?	Yes	<input checked="" type="checkbox"/> No	Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-6
Aft End Ring-to-Fixed Housing Joint (Joint #5) Condition Drawing Worksheet

Motor No.: 360T028

Side: Right (B)

Date: 12/15/92

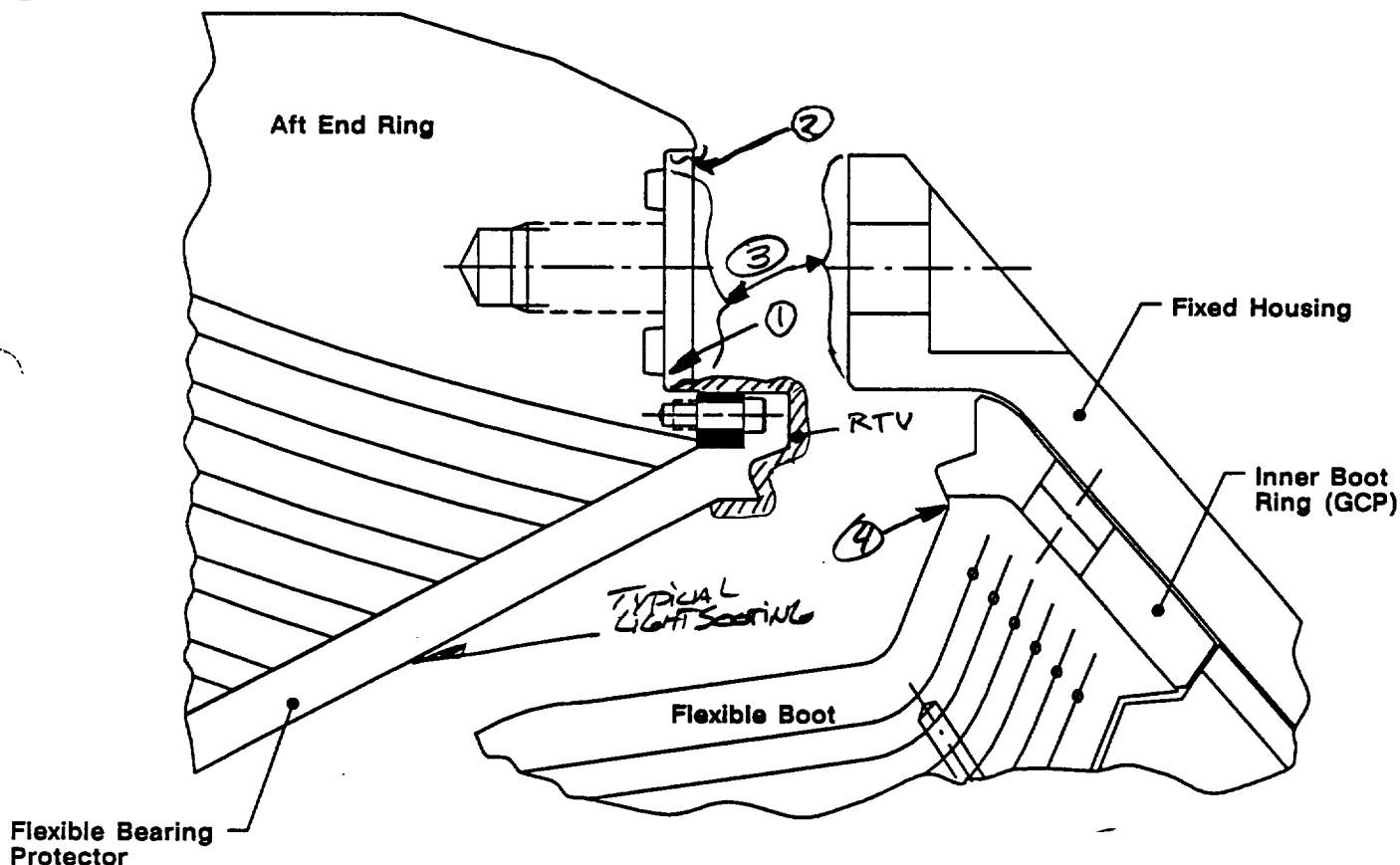
Assessment Engineer(s)/Inspector(s): M. Clark, J. Passman

Sketch Observations Below (include locations and sizes of sketched features):

① RTV NOMINAL CONDITION WITH
INTERMITTENT VOIDS FROM ASSEMBLY.
RTV REACHED PRIMARY FROM
170°-195° AND FROM 335°-0°-8°

② MEDIUM CORROSION: INTERMITTENT.

④ Special Issue 3.3.1: NO EVIDENCE
OF ABNORMAL SEPARATION OR
SIGNS OF PROPAGATION



③ TYPICAL GREASE CONDITION
NO CORROSION.

Clarification Form(s)? ☐ Yes ☒ No

Clarification Form Page No.(s):

REVISION

DOC NO. TWR-64216
SEC

VOL

PAGE C-36

POSTFLIGHT OBSERVATION RECORD (PFOR) C-7
Cowl Insulation Segment Condition

Motor No.: 360T028	Side: Right (B)	Date: 12/15/92
--------------------	-----------------	----------------

Assessment Engineer(s)/Inspector(s): M. CLARK, J. PASSMAN, J. WALKER, P. MILLER

Cowl Insulation Segment Observations:

	Yes	No	Comment #
A. Spring Pin Holes Completely Through the Cowl Segment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Abnormal Heat Effects or Erosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
C. Soot Between the Cowl Segment and Cowl Housing?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. Bondline Failure Mode? Data Collection Only.	N/A	N/A	2

Notes / Comments

① BUBBLES OBSERVED ON THE COWL SEGMENT ID SURFACE AT 195°-210° AND 355°-0°55°.

2) BONDLINE FAILURE MODE: 5% COHESIVE WITHIN SEGMENT
85% ADHESIVE - TO - SEGMENTS
10% ADHESIVE - TO - METAL

Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Preliminary PFAR Number(s): _____
Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-8
Flexible Bearing, Flexible Bearing Protector, and Flexible Boot Condition

Motor No.: 360T028	Side: Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): M.E. Clark, J. Passman		
<u>Flexible Bearing, Bearing Protector, and Boot Observations:</u>		
	Yes	No
A. Bearing Protector Burn-Through?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. Cracks Through the Bearing Protector?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. Bearing Protector Heat Effects or Erosion Other Than at Cowl Vent Hole Locations?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
D. Soot Between the Bearing Protector and Flexible Bearing?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
E. Heat Effects to the Flexible Bearing?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
F. Bent or Broken Bearing Protector Bolts?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
G. Flexible Boot Burn-Through?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
H. Abnormal Heat Effects or Erosion to Flexible Boot ID?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
I. Foreign Material in Boot Cavity?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Notes / Comments		
Preliminary PFAR(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Preliminary PFAR Number(s): _____		
Clarification Form(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Clarification Form Page No.(s): _____		

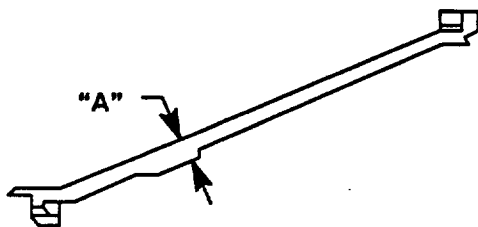
POSTFLIGHT OBSERVATION RECORD (PFOR) C-9
Flexible Bearing Protector Thickness Measurements

Motor No.: 360T028	Side: Right (B)	Date: 12-16-92
--------------------	-----------------	----------------

Assessment Engineer(s)/Inspector(s): Jed. Benson R.R. Gallegos

Record the Flexible Bearing Protector Gas Impingement Area Thickness Measurements (see figure) Below:

Degree Location	Thickness Measurement "A" (Inches)	Degree Location	Thickness Measurement "A" (Inches)	Degree Location	Thickness Measurement "A" (Inches)
0	<u>.734"</u>	120	<u>.748"</u>	240	<u>.704"</u>
10	<u>.724"</u>	130	<u>.753"</u>	250	<u>.712"</u>
20	<u>.753"</u>	140	<u>.745"</u>	260	<u>.718"</u>
30	<u>.747"</u>	150	<u>.728"</u>	270	<u>.731"</u>
40	<u>.741"</u>	160	<u>.748"</u>	280	<u>.746"</u>
50	<u>.740"</u>	170	<u>.723"</u>	290	<u>.733"</u>
60	<u>.748"</u>	180	<u>.724"</u>	300	<u>.720"</u>
70	<u>.735"</u>	190	<u>.728"</u>	310	<u>.750"</u>
80	<u>.736"</u>	200	<u>.734"</u>	320	<u>.736"</u>
90	<u>.736"</u>	210	<u>.728"</u>	330	<u>.740"</u>
100	<u>.725"</u>	220	<u>.725"</u>	340	<u>.735"</u>
110	<u>.733"</u>	230	<u>.709"</u>	350	<u>.750"</u>



* "A" is the minimum thickness of the bearing protector in-line with the cowl vent holes. It corresponds to the deepest gas impingement location.

Notes / Comments

None

eliminary PFAR(s)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Preliminary PFAR Number(s):	
Clarification Form(s)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Clarification Form Page No.(s):	

POSTFLIGHT OBSERVATION RECORD (PFOR) C-10
Throat Diameter Measurements (Data Collection Only)

Motor No.: 360T028 Side: Right (B) Date: 12-16-92

Assessment Engineer(s)/Inspector(s): MIGUEL ENRIQUETA JR

Record the Nozzle Throat Diameter Measurements Below:

Degree Location	Diameter Measurement (inches)
0	<u>55.955"</u>
45	<u>55.965"</u>
90	<u>55.930"</u>
135	<u>55.967</u>

Notes / Comments

Clarification Form(s)? Yes ☒ No Clarification Form Page No.(s): _____

REVISION _____

DOC NO. TWR-64216 VOL
SEC PAGE C-40

POSTFLIGHT OBSERVATION RECORD (PFOR) C-11
Outer Boot Ring Char and Erosion Measurements and Flexible Boot Condition

Motor No.: 360T028	Side: Right (B)	Date: 5/20/93
--------------------	-----------------	---------------

Assessment Engineer(s)/Inspector(s): R. Quirk

Flexible Boot/Outer Boot Ring Separation Observations:

Yes No Comment #

A. Heat Effects in Boot/OBR Separation? ✓

Record the Outer Boot Ring Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
8.0	<u>.01</u>	<u>.92</u>	<u>.03</u>	<u>.99</u>	<u> </u>	<u>1.03*</u>	<u> </u>	<u>1.07*</u>
9.0	<u>.04</u>	<u>.82</u>	<u>.02</u>	<u>.96</u>	<u>.06</u>	<u>.83</u>	<u> </u>	<u>.91*</u>
10.0	<u>.03</u>	<u>.78</u>	<u>.04</u>	<u>.88</u>	<u>.04</u>	<u>.78</u>	<u>.03</u>	<u>.88</u>
11.3	<u>0</u>	<u>.88</u>	<u>.01</u>	<u>.90</u>	<u>.04</u>	<u>.81</u>	<u>.04</u>	<u>.98</u>

Negative Margin of Safety? Yes ✓ No Station: Degree:

Record the Number of Plies Remaining on the Flexible Boot:

Degree Location	Plies Remaining
0	<u>3.2</u>
90	<u>3.0</u>
180	<u>3.7</u>
270	<u>3.1</u>

Negative Margin of Safety? Yes ✓ No Degree:

Notes / Comments

** TOTAL AFFECTED DEPTH*

Preliminary PFAR(s)? Yes ✓ No Preliminary PFAR Number(s):

Clarification Form(s)? Yes ✓ No Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028	Side: Right (B)	Date: 1-8-93
Assessment Engineer(s)/Inspector(s): <u>WILKES / FRESTON</u>		
Phenolic Subassembly: Aft Exit Cone Assembly		

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location							
	0-360							
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-GCP								
Within GCP	100							
GCP-to-CCP								
Within CCP								

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

	Degree Location							
	0-45	45-90	90-135	135-180	180-225	225-270	270-315	315-0
Metal-to-Adhesive	1	4	8	15	1	5	1	3
Within Adhesive	1	2	2	4	1	2	1	1
Adhesive-to-GCP	98	94	90	81	98	93	98	96

Phenolic Removal Method: MUCH HAMMER, WEDGE & PEEL (TYPICAL)

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Voids in Adhesive?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1
C. Corrosion?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D. Foreign Material?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2

Notes / Comments ① SEE PFOR CLARIFICATION FORM PAGE C-42 A.
② TYPICAL .100 DIA MAX. POLYSULFIDE VOIDS THROUGHOUT LENGTH AND CIRCUMFERENCE. POLYSULFIDE REACHED BOTTOM OF GROOVE (AFT END) AROUND FULL CIRCUMFERENCE WITH FEW INTERMITTENT VOIDS.

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☒ Yes ☐ No Clarification Form Page No.(s): C-42 A

Nozzle Subassembly Bondline Adhesive Void Clarification Form

Motor No.: 360T028	Side: <input type="checkbox"/> Left (A) <input checked="" type="checkbox"/> Right (B)	Date: 1-8-93
Assessment Engineer(s)/Inspector(s): WILKES / FRESTON		
Nozzle Subassembly: AFT EXIT CONE ASSY		

Record Bondline Adhesive Void Measurements and Locations Below:

Degree Location	Void Size		Location on Bonding Surface	
	Axial	Circ.	Distance From Fwd	Distance From Aft
1	.30	.50	11.75	
42	.60	.40	33.75	
43	.70	.50	34.30	
47	.38	.52	31.38	
98	1.30	.88	3.75	
242	1.20	.75	28.20	
285	.50	.50	42.25	
320	1.10	.50	6.75	
353	.50	.70	7.75	
354	.75	.40	9.80	

Notes / Comments TYPICALLY VERY FEW SMALL ADHESIVE VOIDS (.500 DIA MAX) WERE OBSERVED AROUND CIRCUMFERENCE.

Corresponding Comment Number(s): 1

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028 Side: Right (B) Date: 12/15/82

Assessment Engineer(s)/Inspector(s): J. WALKER E. DIEHL

Phenolic Subassembly: Forward Exit Cone Assembly

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location							
	0-45	45-90	90-135	135-180	180-225	225-270	270-315	315-360
Metal-to-Adhesive	10	07	15	7	5	5	7	10
Within Adhesive	15	15	15	15	15	15	15	15
Adhesive-to-GCP	75	78	70	78	80	80	78	75
Within GCP								
GCP-to-CCP								
Within CCP								

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

	Degree Location							
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-GCP								

Phenolic Removal Method: _____

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?	<u> </u>	<u> </u>	
B. Voids in Adhesive?	<u> </u>	<u> </u>	<u> 1 </u>
C. Corrosion?	<u> </u>	<u> </u>	<u> 2 </u>
D. Foreign Material?	<u> </u>	<u> </u>	

Notes / Comments

- 1) VOIDS DOCUMENTED ON CLARIFICATION FORM C-43A
- 2) MEDIUM - TO - HEAVY CORROSION ON AREA OF METAL-TO-ADHESIVE SEPARATION

Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): _____

Clarification Form(s)? Yes No Clarification Form Page No.(s): C-43A

Nozzle Subassembly Bondline Adhesive Void Clarification Form

Motor No.: 360T028	Side: <input type="checkbox"/> Left (A) <input checked="" type="checkbox"/> Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): J. WALKER E. DIEHL		
Nozzle Subassembly: FORWARD EXIT CONE		

Record Bondline Adhesive Void Measurements and Locations Below:

Degree Location	Void Size		Location on Bonding Surface	
	Axial	Circ.	Distance From Fwd	Distance From Aft
4°	1.10"	.60"	15.5"	
163°	.95"	.50"		5.7"
176°	1.30"	.60"	9.0"	
261°	1.20"	.30"		12.6"
261°	.60"	.20"		14.9"
261°	.65"	.20"		15.9"
261°	2.70"	.85"		16.75"
294°	1.15"	.50"		9.8"
298°	.65"	.40"		7.6"
317°	.95"	.50"		2.1"
332°	.65"	.40"	11.1"	
340°	1.35"	.70"	2.9"	
351°	2.20"	.85"	7.8"	

Notes / Comments

ORIGINAL PAGE IS
OF POOR QUALITY

Corresponding Comment Number(s): 1

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028	Side: Right (B)	Date: 12/16/92
Assessment Engineer(s)/Inspector(s): <u>T. WALKER</u> <u>T. FRESTON</u>		
Phenolic Subassembly: Throat Assembly		

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location							
	0	45	90	135	180	225	270	315
Metal-to-Adhesive	65	100	100	100	100	95	100	100
Within Adhesive								
Adhesive-to-GCP						5		
Within GCP								
GCP-to-CCP	35							
Within CCP								

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

	Degree Location							
	NR							
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-GCP								

Phenolic Removal Method: _____

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?	_____	<input checked="" type="checkbox"/>	_____
B. Voids in Adhesive?	<input checked="" type="checkbox"/>	_____	<u>1</u>
C. Corrosion?	<input checked="" type="checkbox"/>	_____	<u>2</u>
D. Foreign Material?	_____	<input checked="" type="checkbox"/>	_____

Notes / Comments

1) VOIDS ARE DOCUMENTED ON PAGE C-44A

2. MED TO HEAVY AROUND ENTIRE CIRCUMFERENCE

Preliminary PFAR(s)? _____ Yes ☒ No _____ Preliminary PFAR Number(s): _____

Clarification Form(s)? ☒ Yes _____ No _____ Clarification Form Page No. (s): C-44A

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028 Side: Right (B) Date: 1-18-93

Assessment Engineer(s)/Inspector(s): MILLER / WILKES / DIETHL

Phenolic Subassembly: Aft Inlet/Forward Nose Rings

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location							
	0-45	45-90	90-135	135-180	180-225	225-270	270-315	315-360
Metal-to-Adhesive	100	100	95	100	100	100	90	85
Within Adhesive							5	
Adhesive-to-GCP			5				5	15
Within GCP								
GCP-to-CCP								
Within CCP								

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

NA

	Degree Location							
	0-45	45-90	90-135	135-180	180-225	225-270	270-315	315-360
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-GCP								

Phenolic Removal Method: HAMMER & WEDGE

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?		<input checked="" type="checkbox"/>	
B. Voids in Adhesive?	<input checked="" type="checkbox"/>		1
C. Corrosion?	<input checked="" type="checkbox"/>		2
D. Foreign Material?		<input checked="" type="checkbox"/>	

Notes / Comments ① SEE PFOR CLARIFICATION FORM PAGE 45A & NOTE 1.
② MEDIUM TO HEAVY CORROSION OVER 95% OF BONDLINE AREA.
③ SPECIAL ISSUES, DR-407597 AT 2B3°. SEE PFOR CLARIFICATION FORM PAGE C-45A NOTE 2.

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☒ Yes ☐ No Clarification Form Page No.(s): C-45A

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028

Side: Right (B)

Date: 1-18-93

Assessment Engineer(s)/Inspector(s): MILLER / WILKES / DIEHL

Phenolic Subassembly: Nose Cap

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

Degree Location

	0-360							
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-GCP								
Within GCP								
GCP-to-CCP	100							
Within CCP								

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

Degree Location

	0-45	45-90	90-135	135-180	180-225	225-270	270-315	315-360
Metal-to-Adhesive	20	15	20	20	35	20	30	20
Within Adhesive								
Adhesive-to-GCP	80	85	80	80	65	80	70	80

Phenolic Removal Method: WEDGE & PEEL

Metal Housing Bondline Surface Observations:

Yes

No

Comment #

A. Soot?

☐

☒

B. Voids in Adhesive?

☒

☐

1

C. Corrosion?

☒

☐

3

D. Foreign Material?

☐

☒

Notes / Comments ① SEE PFOR CLARIFICATION FORM PAGE C-46A & NOTE 1

② Special Issues 3.3.2, 3.3.3, and 3.3.4: SEE PFOR CLARIFICATION FORM PAGE C-46A NOTE 2.

③ TYPICAL LIGHT TO MEDIUM CORROSION ON FWD 1.0 IN. MAX INTERMITTENTLY AROUND 60% CIRCUM. AND ON AFT 2.75 IN. MAX AROUND FULL CIRCUM.

Preliminary PFAR(s)? ☐ Yes ☒ No

Preliminary PFAR Number(s):

Clarification Form(s)? ☒ Yes ☐ No

Clarification Form Page No.(s): C-46A

Nozzle Subassembly Bondline Adhesive Void Clarification Form

Motor No.: 360T028	Side: <input type="checkbox"/> Left (A) <input checked="" type="checkbox"/> Right (B)	Date: 1-18-93
Assessment Engineer(s)/Inspector(s): WILKES / DIEHL / MILLER		
Nozzle Subassembly: NOSE CAP		

Record Bondline Adhesive Void Measurements and Locations Below:

Degree Location	Void Size		Location on Bonding Surface	
	Axial	Circ.	Distance From Fwd METAL-TO-AFT	Distance From Aft
131	.30	.20	12.70	
178	.35	.20	10.40	
259	.30	.15	8.50	
297	.34	.21	7.80	
			METAL-TO-FWD	
*13	.35	.15	1.3	
*267	.34	.17	1.45	

* NOSE CAP-TO-FWD NOSE RING INTERFACE.

Notes / Comments ① TYPICAL SMALL ADHESIVE VOIDS, 0.30 IN. DIA. MAXIMUM, WERE OBSERVED THROUGHOUT BONDLINE.

② ADHESIVE VOID AT 178° CORRELATES CLOSELY WITH LDA ON DR 407597 AT 177°. NO VOID WAS OBSERVED AT 244° PER DR 407597 BUT THE HYDRO-LASE CUT 245° MAY HAVE DESTROYED ADHESIVE EVIDENCE ON NOSE CAP. ADHESIVE VOIDS IN NOSE CAP-TO-NOSE INLET RING AT 13° AND 267° CORRELATE CLOSELY WITH LDA'S ON DR-407597. ALL OTHER LDA'S (SEVEN) COULD NOT BE FOUND BUT ALL WERE IN OR NEAR THE CCP CHAR AND EROSION AREA AND EVIDENCE MAY HAVE BEEN BURNED OFF.

Corresponding Comment Number(s): 1

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028	Side: Right (B)	Date: 12-18-92
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Assessment Engineer(s)/Inspector(s): M. Clark

Phenolic Subassembly: Cowl Assembly

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location							
	315-45	45-135	135-225	225-315				
Metal-to-Adhesive	100	100	100	100				
Within Adhesive								
Adhesive-to-SCP								
Within SCP								
SCP-to-CCP								
Within CCP								

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

	Degree Location							
	N/A							
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-SCP								

Phenolic Removal Method: _____

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?		<input checked="" type="checkbox"/>	
B. Voids in Adhesive?	<input checked="" type="checkbox"/>		1
C. Corrosion?	<input checked="" type="checkbox"/>		2
D. Foreign Material?		<input checked="" type="checkbox"/>	

Notes / Comments

- 1) Special Issue 3.3.7: All LDIs were found to be adhesive voids
Reference C-47A
- 2) Medium-to-heavy corrosion on the bonding surface
0°-360°

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s): _____

Clarification Form(s)? ☒ Yes ☐ No Clarification Form Page No.(s): C-47A

Corresponding Comment Number(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12
Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028 Side: Right (B) Date: 12-17-92

Assessment Engineer(s)/Inspector(s): WILKES, MILLER

Phenolic Subassembly: Fixed Housing Assembly

Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):

	Degree Location							
	45-135	135-225	225-315	315-45				TOTAL
Metal-to-Adhesive	30	75	40	73				54
Within Adhesive								
Adhesive-to-GCP	10	22	30	25				22
Within GCP	60	3	30	2				24
GCP-to-CCP								
Within CCP								

METAL - TO - ADHESIVE SEPARATION EXCEEDS 15%
A PRELIMINARY PFAR WAS WRITTEN

Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics):

	Degree Location							
	45-135	135-225	225-315	315-45				
Metal-to-Adhesive			40					
Within Adhesive								
Adhesive-to-GCP	100	100	60	100				

(50%) METAL/ADHESIVE

Phenolic Removal Method: MUCH HAMMERING ON WEDGE & PEEL

Metal Housing Bondline Surface Observations:

	Yes	No	Comment #
A. Soot?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Voids In Adhesive?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
C. Corrosion?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
D. Foreign Material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes / Comments

1) SEE PAGE C-48A FOR VOIDS
2) A DARK LINE WAS STAINED ON THE HOUSING. SEE C-48B & C
3) 3 INDICATIONS WERE FOUND BY ULTRASONICS. 2 SEPARATIONS
WERE FOUND BY VISUAL INSPECTION. CORRELATIONS LINEAR ALIGNMENT
SEE C-48D & E

Preliminary PFAR(s)? ☒ Yes ☐ No Preliminary PFAR Number(s): 534-07

Clarification Form(s)? ☒ Yes ☐ No Clarification Form Page No.(s): 48A-E

General Hardware Clarification Form

Motor No.: 360T028

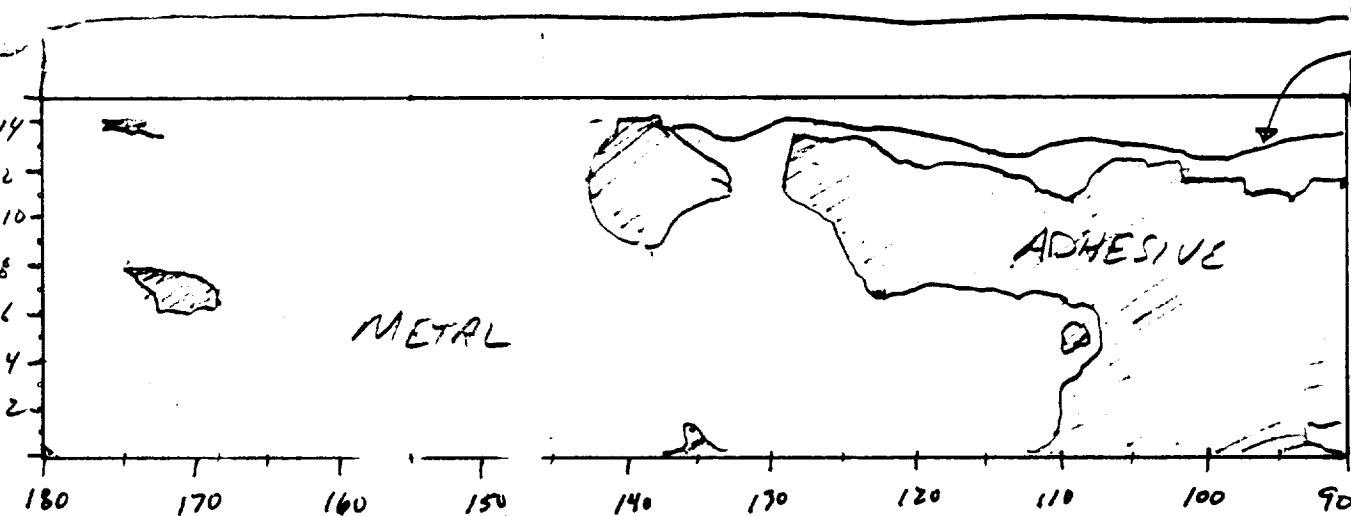
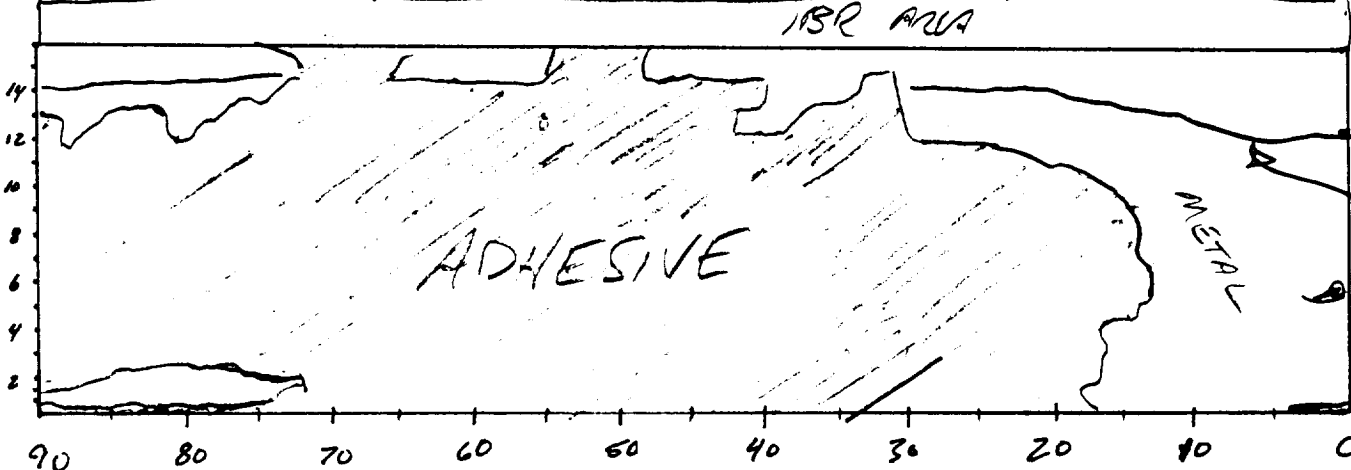
Side: ☐ Left (A) ☒ Right (B)

Date: 12/18/92

Assessment Engineer(s)/Inspector(s): J. WALKER

Description: FIXED HOUSING BONDLINE MAP: METAL SIDE

Sketch Observations Below (Include locations and sizes of sketched features):



Corresponding Comment Number(s): 2, 3

REVISION _____

DOC NO. TWR-64216
SEC _____

VOL _____
PAGE C-48b

General Hardware Clarification Form

Motor No.: 360T028	Side: <input type="checkbox"/> Left (A) <input checked="" type="checkbox"/> Right (B)	Date: 12/18/92
Assessment Engineer(s)/Inspector(s): J. WALKER		
Description: FIXED HOUSING BONDLINE MAP: METAL SIDE		
Sketch Observations Below (Include locations and sizes of sketched features): 2 of 2		
DARK LINES STAINED ON HOUSING		
<div style="text-align: right; margin-bottom: 5px;">INNER BOOT RING AREA</div>		
<div style="text-align: center; margin-bottom: 5px;">IBR AREA</div>		
DARK LINE STAINED ON HOUSING		

Corresponding Comment Number(s): 2, 3

General Hardware Clarification Form

Motor No.: 360T028	Side: <input type="checkbox"/> Left (A) <input checked="" type="checkbox"/> Right (B)	Date: 12/18/92
Assessment Engineer(s)/Inspector(s): J.F. WALKER		
Description: ULTRASONIC INDICATIONS -VS- BONDLINE CONDITION		
Sketch Observations Below (Include locations and sizes of sketched features):		
ULTRASONIC INDICATIONS	BONDLINE CONDITION	
① 50°-70° 5.25"-6.0" AFT OF FWD END	① NO UNBOND FOUND	
② 82°-88° 5.0"-6.0" AFT OF FWD END	② UNBOND AREA FOUND W/ AN AXIAL WIDTH OF 0.8". AREA DEFINED BY A DARK LINE STAINED ON THE HOUSING.	
③ 34° @ 12.5" AFT OF FWD 1" SQUARE AREA	③ NO UNBOND FOUND	
④ 35° @ 15.5" AFT OF FWD 1" x 1.5" AREA	④ NO UNBOND FOUND	
⑤ 90°-105° 5.25"-6.5" AFT OF FWD END	⑤ UNBOND AREA FOUND W/ AN AXIAL WIDTH OF .5" @ 90° INCREASING TO 1.5" AT 100°-105°. AREA DEFINED BY A DARK LINE STAINED ON THE HOUSING.	
⑥ 105° @ 11" AFT OF FWD END	⑥ NO UNBOND FOUND	

ORIGINAL PAGE IS
OF BEST QUALITY

Corresponding Comment Number(s):

REVISION _____

DOC NO. TWR-64216	VOL
SEC	PAGE C-48d

General Hardware Clarification Form

Motor No.: 360T028	Side: <input type="checkbox"/> Left (A) <input checked="" type="checkbox"/> Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): J. F. WALKER		
Description: ULTRASONIC INDICATIONS - VS - BONDLINE CONDITION		
Sketch Observations Below (Include locations and sizes of sketched features):		
<p>ULTRASONIC INDICATIONS</p> <p>⑦ 175° - 188° 5" - 6" AFT OF FWD END</p> <p>③ 180° - 210° 5" - 6" AFT OF FWD END INTERMITTENT</p>	<p>BONDLINE CONDITION</p> <p>(POSSIBLE CORRELATION)</p> <p>⑦ NO UNBOND EVIDENCE FOUND; HOWEVER, THIS AREA IS WITHIN AN AREA OF METAL-TO-ADHESIVE PRIMARY SEPARATION MODE. NO "DARK LINE" PRESENT.</p> <p>⑧ AS ⑦ ABOVE. (POSSIBLE CORRELATION)</p>	

ORIGINAL PAGE IS
OF POOR QUALITY

Corresponding Comment Number(s): 2, 3

REVISION _____

DOC NO. TWR-64216 | VOL
SEC | PAGE C-48e

POSTFLIGHT OBSERVATION RECORD (PFOR) C-13
Cowl Ring Phenolic (CCP) Section Condition

Motor No.: 360T028	Side: Right (B)	Date: 5/18/93
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Assessment Engineer(s)/Inspector(s): R. Quick

Cowl Phenolic Section Observations:

	Yes	No	Comment #
A. Cross-ply cracking in virgin material?	<u> </u>	<u> ✓ </u>	<u> </u>
B. Ply lifting?	<u> ✓ </u>	<u> </u>	<u> 42 </u>

Record the Cowl Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
0.3	<u>.23</u>	<u>.62</u>	<u>.23</u>	<u>.63</u>	<u>.23</u>	<u>.64</u>	<u>.20</u>	<u>.68</u>
1.0	<u>.29</u>	<u>.59</u>	<u>.29</u>	<u>.63</u>	<u>.30</u>	<u>.61</u>	<u>.24</u>	<u>.66</u>
2.0	<u>.33</u>	<u>.60</u>	<u>.33</u>	<u>.65</u>	<u>.35</u>	<u>.61</u>	<u>.29</u>	<u>.64</u>
3.0	<u>.35</u>	<u>.55</u>	<u>.38</u>	<u>.61</u>	<u>.40</u>	<u>.59</u>	<u>.29</u>	<u>.63</u>
4.0	<u>.34</u>	<u>.59</u>	<u>.39</u>	<u>.62</u>	<u>.40</u>	<u>.62</u>	<u>.29</u>	<u>.59</u>
5.0	<u> </u>	<u>.99*</u>	<u> </u>	<u>1.09*</u>	<u> </u>	<u>1.03*</u>	<u> </u>	<u>.99*</u>
6.0	<u> </u>	<u>.91*</u>	<u> </u>	<u>1.09*</u>	<u> </u>	<u>1.17*</u>	<u> </u>	<u>1.05*</u>
6.8	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

Negative Margin of Safety? Yes ✓ No Station: Degree:

Notes / Comments 1-PLY LIFT AT 0° FROM STATION .3 TO 2.2

2-PLY LIFT AT 180° FROM STATION .3 TO 3

* TOTAL AFFECTED DEPTH

Preliminary PFAR(s)? Yes ✓ No Preliminary PFAR Number(s):

Clarification Form(s)? Yes ✓ No Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-14
Forward Exit Cone Phenolic (CCP) Section Condition

Motor No.: 360T028	Side: Right (B)	Date: 5/18/93
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Assessment Engineer(s)/Inspector(s): R. Quick

Forward Exit Cone Phenolic Section Observations:

Yes No Comment #

A. Cross-ply cracking in virgin material?

_____ ✓ _____

B. Ply lifting?

_____ ✓ _____

Record the Forward Exit Cone Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
1.0	<u>.32</u>	<u>.74</u>	<u>.32</u>	<u>.72</u>	<u>.39</u>	<u>.71</u>	<u>.37</u>	<u>.78</u>
4.0	<u>.36</u>	<u>.65</u>	<u>.33</u>	<u>.69</u>	<u>.38</u>	<u>.64</u>	<u>.39</u>	<u>.67</u>
4.6	<u>.34</u>	<u>.64</u>	<u>.29</u>	<u>.69</u>	<u>.36</u>	<u>.67</u>	<u>.39</u>	<u>.68</u>
8.0	<u>.34</u>	<u>.64</u>	_____	_____	_____	_____	<u>.42</u>	<u>.69</u>
12.0	<u>.23</u>	<u>.63</u>	_____	_____	_____	_____	_____	_____
16.0	_____	_____	_____	_____	_____	_____	_____	_____
20.0	_____	_____	_____	_____	_____	_____	_____	_____
24.0	_____	_____	_____	_____	_____	_____	_____	_____
28.0	_____	_____	_____	_____	_____	_____	_____	_____
32.0	_____	_____	_____	_____	_____	_____	_____	_____
32.9	_____	_____	_____	_____	_____	_____	_____	_____
34.0	_____	_____	_____	_____	_____	_____	_____	_____

Negative Margin of Safety? _____ Yes ✓ No Station: _____ Degree: _____

Notes / Comments

Preliminary PFAR(s)? _____ Yes ✓ No Preliminary PFAR Number(s): _____

Clarification Form(s)? _____ Yes ✓ No Clarification Form Page No.(s): _____

POSTFLIGHT OBSERVATION RECORD (PFOR) C-15
Fixed Housing Phenolic (CCP) Section Condition

Motor No.: 360T028	Side: Right (B)	Date: 5/19/93
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Assessment Engineer(s)/Inspector(s): R. Quick

Fixed Housing Phenolic Section Observations:

	Yes	No	Comment #
A. Cross-ply cracking in virgin material?	<u> </u>	<u> ✓ </u>	<u> </u>
B. Ply lifting?	<u> </u>	<u> ✓ </u>	<u> </u>

Record the Fixed Housing Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
0.0	<u>.10</u>	<u>1.12</u>	<u>.10</u>	<u>1.08</u>	<u>.10</u>	<u>1.00</u>	<u>.12</u>	<u>1.13</u>
1.0	<u>.04</u>	<u>1.11</u>	<u>.08</u>	<u>1.11</u>	<u>.04</u>	<u>1.00</u>	<u>.03</u>	<u>1.02</u>
2.0	<u>.01</u>	<u>1.00</u>	<u>0</u>	<u>1.02</u>	<u>.04</u>	<u>.92</u>	<u>0</u>	<u>.99</u>
3.0	<u>0</u>	<u>.96</u>	<u>0</u>	<u>1.04</u>	<u>.04</u>	<u>.90</u>	<u>0</u>	<u>1.04</u>
4.0	<u>0</u>	<u>.93</u>	<u>0</u>	<u>1.03</u>	<u>.02</u>	<u>.91</u>	<u>0</u>	<u>1.01</u>
5.0	<u>0</u>	<u>.96</u>	<u>0</u>	<u>1.03</u>	<u>.03</u>	<u>.88</u>	<u>0</u>	<u>1.03</u>
6.0	<u>0</u>	<u>.95</u>	<u>0</u>	<u>1.00</u>	<u>.03</u>	<u>.89</u>	<u>0</u>	<u>.92</u>
7.0	<u>0</u>	<u>.92</u>	<u>0</u>	<u>.89</u>	<u>.03</u>	<u>.84</u>	<u>0</u>	<u>.92</u>
8.0	<u>0</u>	<u>.82</u>	<u>0</u>	<u>.71</u>	<u>0</u>	<u>.85</u>	<u>0</u>	<u>.80</u>
9.0	<u>0</u>	<u>.67</u>	<u>0</u>	<u>.75</u>	<u>0</u>	<u>.78</u>	<u>0</u>	<u>.98</u>
10.75	<u>0</u>	<u>1.58</u>	<u>0</u>	<u>1.83</u>	<u>0</u>	<u>1.79</u>	<u>0</u>	<u>1.72</u>

Negative Margin of Safety? Yes ✓ No Station: Degree:

Notes / Comments

Preliminary PFAR(s)? Yes ✓ No Preliminary PFAR Number(s):

Clarification Form(s)? Yes ✓ No Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-16
Throat Inlet Assembly Phenolic (CCP) Section Condition

Motor No.: 360T028 Side: Right (B) Date: 5/19/93

Assessment Engineer(s)/Inspector(s): E. Quick

Throat Inlet Assembly Phenolic Section Observations:

	Yes	No	Comment #
A. Cross-ply cracking in virgin material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. Ply lifting?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Record the Throat Inlet Ring and Throat Ring Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
1.0	1.02	.56	1.08	.55	1.01	.60	1.11	.63
2.0	1.07	.56	1.15	.50	1.04	.58	1.08	.56
4.0	1.14	.54	1.21	.45	1.12	.50	1.07	.55
6.0	1.19	.58	1.23	.50	1.18	.54	1.26	.46
8.0	1.22	.51	1.25	.45	1.23	.54	WEDGE	OUT
10.0	1.18	.52	1.18	.47	1.19	.57	1.16	.50
12.0	1.16	.48	1.19	.46	1.18	.54	1.15	.51
14.0	1.18	.53	1.15	.44	1.16	.55	1.12	.58
16.0	1.10	.47	1.09	.53	1.09	.54	1.05	.60
18.0	.96	.49	.93	.75	.99	.55	.95	.59
20.0	.84	.55	.76	.62	.78	.61	.71	.71
22.0	.55	.56	.47	.62	.55	.67	.48	.71
23.0	.47	.54	.38	.58	.45	.70	.36	.73

Negative Margin of Safety? ☐ Yes ☒ No Station: Degree:

Notes / Comments

Preliminary PFAR(s)? ☐ Yes ☒ No Preliminary PFAR Number(s):

Clarification Form(s)? ☐ Yes ☒ No Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-17
Nose Cap Phenolic (CCP) Section Condition

Motor No.: 360T028	Side: Right (B)	Date: 5/20/93
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Assessment Engineer(s)/Inspector(s): R. QUICK

Nose Cap Phenolic Section Observations:

Yes	No	Comment #
<u> </u>	<u> ✓ </u>	<u> </u>
<u> </u>	<u> ✓ </u>	<u> </u>

- A. Cross-ply cracking in virgin material?
B. Ply lifting?

Record the Nose Cap Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
1.5	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
4.0	<u>.36</u>	<u>.58</u>	<u>.43</u>	<u>.51</u>	<u>.36</u>	<u>.50</u>	<u>.30</u>	<u>.59</u>
6.0	<u>.37</u>	<u>.52</u>	<u>.45</u>	<u>.45</u>	<u>.38</u>	<u>.46</u>	<u>.33</u>	<u>.51</u>
8.0	<u>.46</u>	<u>.54</u>	<u>.49</u>	<u>.46</u>	<u>.49</u>	<u>.46</u>	<u>.41</u>	<u>.46</u>
10.0	<u>.51</u>	<u>.49</u>	<u>.49</u>	<u>.42</u>	<u>.49</u>	<u>.42</u>	<u>.42</u>	<u>.47</u>
12.0	<u>.52</u>	<u>.51</u>	<u>.58</u>	<u>.47</u>	<u>.58</u>	<u>.47</u>	<u>.47</u>	<u>.44</u>
14.0	<u>.55</u>	<u>.52</u>	<u>.73</u>	<u>.35</u>	<u>.66</u>	<u>.37</u>	<u>.48</u>	<u>.52</u>
16.0	<u>.67</u>	<u>.42</u>	<u>.74</u>	<u>.43</u>	<u>.74</u>	<u>.34</u>	<u>.61</u>	<u>.44</u>
18.0	<u>.78</u>	<u>.42</u>	<u>.86</u>	<u>.41</u>	<u>.78</u>	<u>.38</u>	<u>.68</u>	<u>.46</u>
20.0	<u>.96</u>	<u>.42</u>	<u>1.08</u>	<u>.40</u>	<u>1.08</u>	<u>.40</u>	<u>.86</u>	<u>.49</u>
22.0	<u>1.43</u>	<u>.65</u>	<u>1.68</u>	<u>.57</u>	<u>1.68</u>	<u>.57</u>	<u>1.35</u>	<u>.55</u>
24.0	<u>1.65</u>	<u>.75</u>	<u>1.83</u>	<u>.64</u>	<u>1.83</u>	<u>.64</u>	<u>1.57</u>	<u>.76</u>
26.0	<u>1.14</u>	<u>.82</u>	<u>1.31</u>	<u>.61</u>	<u>1.31</u>	<u>.61</u>	<u>1.10</u>	<u>.82</u>

Negative Margin of Safety? Yes ✓ No Station: Degree:

Notes / Comments

Preliminary PFAR(s)? Yes ✓ No Preliminary PFAR Number(s):

Clarification Form(s)? Yes ✓ No Clarification Form Page No.(s):

POSTFLIGHT OBSERVATION RECORD (PFOR) C-18
Forward Nose Ring and Aft Inlet Ring Phenolic (CCP) Section Condition

Motor No.: 360T028	Side: Right (B)	Date: 5/20/93
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Assessment Engineer(s)/Inspector(s): R. Quick

Forward Nose and Aft Inlet Ring Phenolic Section Observations:	Yes	No	Comment #
A. Cross-ply cracking in virgin material?	<u> </u>	<u> ✓ </u>	<u> </u>
B. Ply lifting?	<u> </u>	<u> ✓ </u>	<u> </u>

Record the Forward Nose Ring (-503) Char and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
28.0	<u>1.16</u>	<u>.65</u>	<u>1.15</u>	<u>.68</u>	<u>1.20</u>	<u>.71</u>	<u>1.03</u>	<u>.74</u>
30.0	<u>.91</u>	<u>.66</u>	<u>.94</u>	<u>.62</u>	<u>.93</u>	<u>.72</u>	<u>.93</u>	<u>.68</u>
32.0	<u>.92</u>	<u>.66</u>	<u>.93</u>	<u>.67</u>	<u>.93</u>	<u>.65</u>	<u>.97</u>	<u>.62</u>

Negative Margin of Safety? Yes No Station: Degree:

Record the Aft Inlet Ring Char (-504) and Erosion Measurements Below:

Station	0°		90°		180°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
34.0	<u>.84</u>	<u>.59</u>	<u>.92</u>	<u>.60</u>	<u>.89</u>	<u>.63</u>	<u>.89</u>	<u>.59</u>
36.0	<u>.88</u>	<u>.56</u>	<u>.93</u>	<u>.61</u>	<u>.94</u>	<u>.57</u>	<u>.92</u>	<u>.63</u>
38.0	<u>.96</u>	<u>.57</u>	<u>1.01</u>	<u>.64</u>	<u>1.02</u>	<u>.58</u>	<u>1.01</u>	<u>.58</u>
39.0	<u>.96</u>	<u>.58</u>	<u>1.03</u>	<u>.67</u>	<u>1.02</u>	<u>.61</u>	<u>.92</u>	<u>.60</u>

Negative Margin of Safety? Yes ✓ No Station: Degree:

Notes / Comments

Preliminary PFAR(s)? Yes ✓ No Preliminary PFAR Number(s):

Clarification Form(s)? Yes ✓ No Clarification Form Page No.(s):

General Hardware Clarification Form

Motor No.: 360T028

Side: ☒ Left (A) ☐ Right (B)

Date: 5/20/93

Assessment Engineer(s)/Inspector(s): R. QUICK

Description: AFT EXIT CONE ASSEMBLY

Sketch Observations Below (include locations and sizes of sketched features):

DEGREE											
0			18		30		90		128		
STATION	EROSION	CHAR	EROSION	CHAR	EROSION	CHAR	EROSION	CHAR	EROSION	CHAR	
101.77											
107.77			.17	.55	.16	.50					
113.77	.15	.56	.18	.57	.18	.54	.17	.60	.12	.60	
119.77											

DEGREE													
180			220			225			263			270	
STATION	EROSION	CHAR	EROSION	CHAR	EROSION	CHAR	EROSION	CHAR	EROSION	CHAR	EROSION	CHAR	
101.77							.16	.59	.15		.15	.58	
107.77	.12	.58	.14	.56			.15	.51	.16		.16	.54	
113.77	.12	.60	.12	.63			.14	.55	.16		.16	.54	
119.77													

DEGREE											
278			255°								
STATION	EROSION	CHAR	EROSION	CHAR	EROSION	CHAR	EROSION	CHAR	EROSION	CHAR	
101.77	.11	.64	.12	.55							
107.77	.13	.51	.15	.55							
113.77	.16	.61	.15	.57							
119.77											

Negative Margin of Safety

Yes ☒ No ☐

Station: _____ Degree: _____

No ☒ Yes ☐

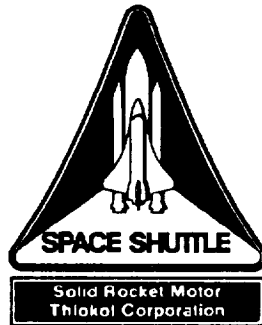
Comments #

AFT EXIT CONE PHENOLIC SECTION OBSERVATIONS:

A. Cross ply cracking in virgin material?

B. Ply lifting?

Corresponding Comment Number(s): _____



Appendix D Nozzle Postfire Data

Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

November 1993

Prepared for:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812

Contract No.	NAS8-38100
DR No.	4-23
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Thiokol CORPORATION
SPACE OPERATIONS

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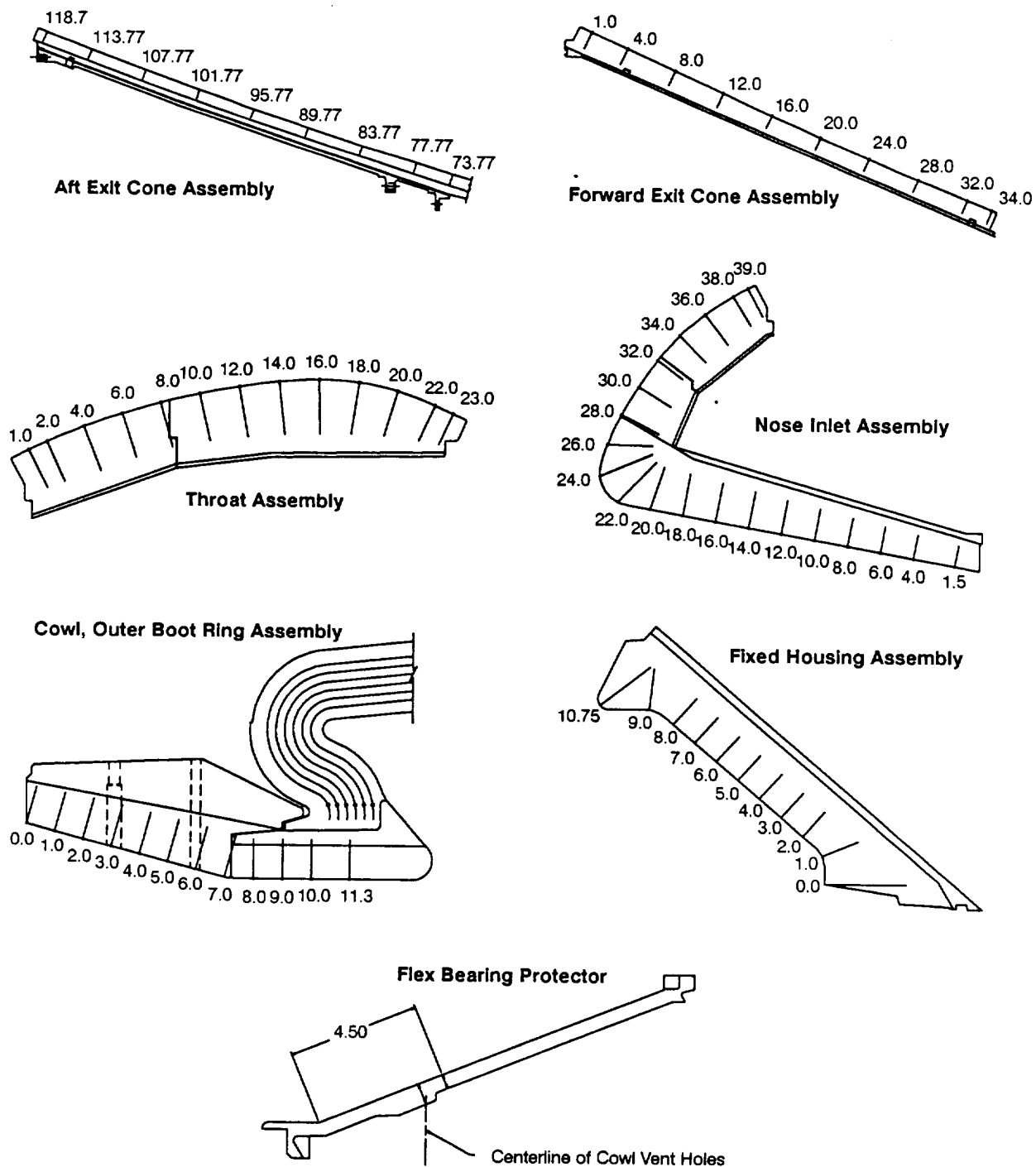


Figure D-1. RSRM Nozzle Liner Char and Erosion Station Locations

Table D-I. RSRM-28A Forward Exit Cone Assembly Char and Erosion Data

Angular Location	Stations												
	0 degrees	1.0	4.0	4.6	8.0	12.0	16.0	20.0	24.0	28.0	32.0	32.9	34.0
0 degrees	Measured Erosion	0.37	0.38	0.36	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Measured Char	0.80	0.74	0.74	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Char *	0.64	0.59	0.59	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Denominator	1.43	1.39	1.43	NA	NA	NA	NA	NA	NA	NA	NA	NA
	RSRM Liner Thickness	1.807	1.731	1.411	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Margin of Safety	0.26	0.25	0.25	NA	NA	NA	NA	NA	NA	NA	NA	NA
	90 degrees												
90 degrees	Measured Erosion	0.34	0.34	0.34	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Measured Char	0.77	0.75	0.76	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Char *	0.62	0.60	0.61	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Denominator	1.35	1.33	1.12	NA	NA	NA	NA	NA	NA	NA	NA	NA
	RSRM Liner Thickness	1.807	1.731	1.411	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Margin of Safety	0.34	0.30	0.26	NA	NA	NA	NA	NA	NA	NA	NA	NA
	180 degrees												
180 degrees	Measured Erosion	0.35	0.33	0.35	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Measured Char	0.74	0.76	0.73	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Char *	0.59	0.61	0.58	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Denominator	1.33	1.32	1.11	NA	NA	NA	NA	NA	NA	NA	NA	NA
	RSRM Liner Thickness	1.807	1.731	1.411	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Margin of Safety	0.35	0.31	0.27	NA	NA	NA	NA	NA	NA	NA	NA	NA
	270 degrees												
270 degrees	Measured Erosion	0.34	0.34	0.34	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Measured Char	0.80	0.80	0.80	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Char *	0.64	0.64	0.64	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Denominator	1.38	1.38	1.15	NA	NA	NA	NA	NA	NA	NA	NA	NA
	RSRM Liner Thickness	1.807	1.731	1.411	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Margin of Safety	0.31	0.26	0.23	NA	NA	NA	NA	NA	NA	NA	NA	NA

Minimum margin of safety is 0.23 at station 4.60 degree 270.00
Maximum margin of safety is 0.35 at station 1.00 degree 180.00

* Measured char adjusted to end of action time

$$\text{Margin of Safety} = \frac{\text{minimum liner thickness}}{1.50 \times \text{erosion} + 1.00 \times \text{adj char}} - 1$$

Table D-II. RSRM-28B Forward Exit Cone Assembly Char and Erosion Data

Angular Location	Stations												
	0 degrees	1.0	4.0	4.6	8.0	12.0	16.0	20.0	24.0	28.0	32.0	32.9	34.0
90 degrees	Measured Erosion	0.32	0.36	0.34	0.34	0.23	NA	NA	NA	NA	NA	NA	NA
	Measured Char	0.74	0.65	0.64	0.64	0.63	NA	NA	NA	NA	NA	NA	NA
	Adjusted Char *	0.59	0.52	0.51	0.51	0.50	NA	NA	NA	NA	NA	NA	NA
	Denominator	1.28	1.26	1.02	1.22	1.02	NA	NA	NA	NA	NA	NA	NA
	RSRM Liner Thickness	1.807	1.731	1.411	1.629	1.524	NA	NA	NA	NA	NA	NA	NA
	Margin of Safety	0.41	0.37	0.38	0.34	0.49	NA	NA	NA	NA	NA	NA	NA
180 degrees	Measured Erosion	0.32	0.33	0.29	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Measured Char	0.72	0.69	0.69	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Char *	0.58	0.55	0.55	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Denominator	1.26	1.25	0.99	NA	NA	NA	NA	NA	NA	NA	NA	NA
	RSRM Liner Thickness	1.807	1.731	1.411	1.629	1.524	NA	NA	NA	NA	NA	NA	NA
	Margin of Safety	0.43	0.38	0.43	NA	NA	NA	NA	NA	NA	NA	NA	NA
270 degrees	Measured Erosion	0.39	0.38	0.36	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Measured Char	0.71	0.64	0.67	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Char *	0.57	0.51	0.54	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Denominator	1.37	1.29	1.08	NA	NA	NA	NA	NA	NA	NA	NA	NA
	RSRM Liner Thickness	1.807	1.731	1.411	1.629	1.524	NA	NA	NA	NA	NA	NA	NA
	Margin of Safety	0.32	0.35	0.31	NA	NA	NA	NA	NA	NA	NA	NA	NA
Minimum margin of safety is 0.16 at station 8.00 degree 270.00 Maximum margin of safety is 0.49 at station 12.00 degree 0.00	Measured Erosion	0.37	0.39	0.39	0.42	NA	NA	NA	NA	NA	NA	NA	NA
	Measured Char	0.78	0.67	0.68	0.69	NA	NA	NA	NA	NA	NA	NA	NA
	Adjusted Char *	0.62	0.54	0.54	0.55	NA	NA	NA	NA	NA	NA	NA	NA
	Denominator	1.41	1.33	1.13	1.40	NA	NA	NA	NA	NA	NA	NA	NA
	RSRM Liner Thickness	1.807	1.731	1.411	1.629	1.524	NA	NA	NA	NA	NA	NA	NA
	Margin of Safety	0.28	0.30	0.25	0.16	NA	NA	NA	NA	NA	NA	NA	NA

* Measured char adjusted to end of action time

Margin of Safety = $\frac{\text{minimum liner thickness}}{1.70 \times \text{erosion} + 1.25 \times \text{adj char}}$ - 1

Table D-III. RSRM-28A Throat Assembly Char and Erosion Data

Angular Location	Stations													
	0 degrees	1.0	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	23.0
Measured Erosion		1.04	1.15	1.12	1.17	1.21	1.22	1.19	1.16	1.08	1.07	0.78	0.51	0.39
Measured Char		0.54	0.53	0.50	0.51	0.50	0.41	0.37	0.47	0.55	0.58	0.61	0.62	0.69
Adjusted Char *		0.41	0.40	0.38	0.38	0.38	0.31	0.28	0.35	0.41	0.46	0.49	0.50	0.55
Denominator		2.59	2.80	2.71	2.82	2.89	2.82	2.73	2.76	2.68	2.72	2.17	1.64	1.47
RSRM Liner Thickness		3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.586	3.231	2.583	2.110
Margin of Safety		0.23	0.16	0.22	0.16	0.10	0.20	0.29	0.31	0.39	0.32	0.49	0.57	0.44
90 degrees														
Measured Erosion		1.01	1.03	1.09	1.13	1.21	1.18	1.12	1.13	1.07	0.93	0.73	0.48	0.40
Measured Char		0.47	0.52	0.54	0.56	0.48	0.47	0.44	0.42	0.42	0.52	0.55	0.62	0.71
Adjusted Char *		0.35	0.39	0.41	0.42	0.36	0.35	0.33	0.32	0.32	0.42	0.44	0.50	0.57
Denominator		2.46	2.55	2.69	2.78	2.87	2.80	2.65	2.65	2.53	2.38	2.01	1.58	1.51
RSRM Liner Thickness		3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.586	3.231	2.583	2.110
Margin of Safety		0.29	0.27	0.23	0.18	0.11	0.21	0.33	0.37	0.46	0.51	0.61	0.63	0.40
180 degrees														
Measured Erosion		1.02	1.05	1.11	1.12	1.17	1.17	1.17	1.14	1.09	0.92	0.68	0.44	0.36
Measured Char		0.47	0.48	0.46	0.52	0.46	0.40	0.36	0.37	0.44	0.59	0.64	0.67	0.73
Adjusted Char *		0.35	0.36	0.35	0.39	0.35	0.30	0.27	0.28	0.33	0.47	0.51	0.54	0.58
Denominator		2.48	2.55	2.65	2.73	2.77	2.71	2.68	2.63	2.59	2.43	2.00	1.55	1.45
RSRM Liner Thickness		3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.586	3.231	2.583	2.110
Margin of Safety		0.28	0.27	0.25	0.20	0.15	0.25	0.31	0.38	0.43	0.48	0.62	0.67	0.46
270 degrees														
Measured Erosion		1.05	1.05	1.12	1.16	1.20	1.18	1.17	1.13	1.08	0.93	0.85	0.53	0.37
Measured Char		0.47	0.49	0.52	0.55	0.58	0.44	0.47	0.47	0.49	0.51	0.56	0.56	0.70
Adjusted Char *		0.35	0.37	0.39	0.41	0.43	0.33	0.35	0.35	0.37	0.41	0.45	0.45	0.56
Denominator		2.54	2.56	2.73	2.84	2.94	2.77	2.78	2.70	2.62	2.37	2.26	1.62	1.44
RSRM Liner Thickness		3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.586	3.231	2.583	2.110
Margin of Safety		0.25	0.27	0.22	0.16	0.08	0.23	0.26	0.34	0.42	0.51	0.43	0.59	0.47

Minimum margin of safety is 0.08 at station 8.00 degree 270.00
Maximum margin of safety is 0.67 at station 22.00 degree 180.00

* Measured char adjusted to end of action time

$$\text{Margin of Safety} = \frac{\text{minimum liner thickness}}{2.00 \times \text{erosion} + 1.25 \times \text{adj char}} - 1$$

Table D-IV. RSRM-28B Throat Assembly Char and Erosion Data

Angular Location	Stations										
	0	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0
Measured Erosion	1.02	1.07	1.14	1.19	1.23	1.18	1.16	1.18	1.10	0.96	0.84
Measured Char	0.56	0.56	0.54	0.58	0.51	0.52	0.48	0.53	0.47	0.49	0.55
Adjusted Char *	0.42	0.42	0.41	0.43	0.38	0.39	0.36	0.40	0.35	0.43	0.55
Denominator	2.56	2.67	2.79	2.92	2.92	2.80	2.77	2.86	2.64	2.41	2.23
RSRM Liner Thickness	3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.586	3.231
Margin of Safety	0.24	0.22	0.19	0.12	0.09	0.19	0.27	0.27	0.40	0.49	0.45
90 degrees											
Measured Erosion	1.08	1.15	1.21	1.23	1.25	1.18	1.19	1.15	1.09	0.93	0.76
Measured Char	0.55	0.50	0.45	0.50	0.45	0.47	0.46	0.44	0.53	0.75	0.62
Adjusted Char *	0.41	0.38	0.34	0.38	0.34	0.35	0.35	0.33	0.40	0.60	0.50
Denominator	2.68	2.77	2.84	2.93	2.92	2.80	2.81	2.71	2.68	2.61	2.14
RSRM Liner Thickness	3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.586	3.231
Margin of Safety	0.19	0.17	0.17	0.12	0.09	0.21	0.25	0.34	0.39	0.37	0.51
180 degrees											
Measured Erosion	1.01	1.04	1.12	1.18	1.23	1.19	1.18	1.16	1.09	0.99	0.78
Measured Char	0.60	0.58	0.50	0.54	0.54	0.57	0.54	0.55	0.54	0.55	0.61
Adjusted Char *	0.45	0.43	0.38	0.41	0.41	0.43	0.41	0.41	0.41	0.44	0.49
Denominator	2.58	2.62	2.71	2.87	2.97	2.91	2.87	2.84	2.69	2.53	2.17
RSRM Liner Thickness	3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.586	3.231
Margin of Safety	0.23	0.24	0.22	0.14	0.07	0.17	0.23	0.28	0.38	0.42	0.49
270 degrees											
Measured Erosion	1.11	1.08	1.07	1.26	NA	1.16	1.15	1.12	1.05	0.95	0.71
Measured Char	0.63	0.56	0.55	0.46	NA	0.50	0.51	0.58	0.60	0.59	0.71
Adjusted Char *	0.47	0.42	0.41	0.35	NA	0.38	0.38	0.43	0.45	0.47	0.57
Denominator	2.81	2.69	2.66	2.95	NA	2.79	2.78	2.78	2.66	2.49	2.13
RSRM Liner Thickness	3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.586	3.231
Margin of Safety	0.13	0.21	0.25	0.11	NA	0.22	0.27	0.30	0.39	0.44	0.52

Minimum margin of safety is 0.07 at station 8.00 degree 180.00
Maximum margin of safety is 0.66 at station 22.00 degree 90.00

* Measured char adjusted to end of action time

Margin of Safety = $\frac{\text{minimum liner thickness}}{2.00 \times \text{erosion} + 1.25 \times \text{adj char}^*}$ - 1

Table D-V. RSRM-28A Nose Inlet Rings (-503, -504) Char and Erosion Data

Angular Location	Stations						
	28.0	30.0	32.0	34.0	36.0	38.0	39.0
0 degrees							
Measured Erosion	1.27	0.99	0.91	0.88	0.91	1.03	1.05
Measured Char *	0.69	0.71	0.64	0.55	0.60	0.56	0.60
Adjusted Char *	0.52	0.53	0.48	0.41	0.45	0.42	0.45
Denominator	3.19	2.65	2.42	2.28	2.38	2.58	2.66
RSRM Liner Thickness	3.508	3.252	2.950	3.182	3.200	3.026	3.000
Margin of Safety	0.10	0.23	0.22	0.40	0.34	0.17	0.13
90 degrees							
Measured Erosion	1.11	0.91	0.91	0.87	0.89	0.99	1.02
Measured Char *	0.63	0.71	0.55	0.60	0.63	0.59	0.61
Adjusted Char *	0.47	0.53	0.41	0.45	0.47	0.44	0.46
Denominator	2.81	2.49	2.34	2.30	2.37	2.53	2.61
RSRM Liner Thickness	3.508	3.252	2.950	3.182	3.200	3.026	3.000
Margin of Safety	0.25	0.31	0.26	0.38	0.35	0.19	0.15
180 degrees							
Measured Erosion	1.07	0.90	0.93	0.83	0.86	0.93	0.97
Measured Char *	0.69	0.69	0.63	0.55	0.58	0.58	0.61
Adjusted Char *	0.52	0.52	0.47	0.41	0.43	0.43	0.46
Denominator	2.79	2.45	2.45	2.18	2.26	2.40	2.51
RSRM Liner Thickness	3.508	3.252	2.950	3.182	3.200	3.026	3.000
Margin of Safety	0.26	0.33	0.20	0.46	0.41	0.26	0.19
270 degrees							
Measured Erosion	1.12	0.97	0.95	0.88	0.92	1.02	1.08
Measured Char *	0.66	0.69	0.63	0.56	0.62	0.65	0.65
Adjusted Char *	0.50	0.52	0.47	0.42	0.47	0.49	0.49
Denominator	2.86	2.59	2.49	2.29	2.42	2.65	2.77
RSRM Liner Thickness	3.508	3.252	2.950	3.182	3.200	3.026	3.000
Margin of Safety	0.23	0.26	0.18	0.39	0.32	0.14	0.08

* Measured char adjusted to end of action time

Margin of Safety = $\frac{\text{minimum liner thickness}}{2.00 \times \text{erosion} + 1.25 \times \text{adj char}}$ - 1

Table D-VI. RSRM-28B Nose Inlet Rings (-503, -504) Char and Erosion Data

Angular Location	Stations							
	0	degrees	28.0	30.0	32.0	34.0	36.0	38.0 39.0
Measured Erosion	1.16		0.91	0.92	0.92	0.84	0.88	0.96
Measured Char *	0.65		0.66	0.66	0.66	0.59	0.56	0.57
Adjusted Char *	0.49		0.50	0.50	0.50	0.44	0.42	0.43
Denominator	2.93		2.44	2.46	2.46	2.29	2.29	2.46
RSRM Liner Thickness	3.508		3.252	2.950	2.950	3.182	3.200	3.000
Margin of Safety	0.20		0.33	0.20	0.20	0.42	0.40	0.23
90 degrees								
Measured Erosion	1.15		0.94	0.93	0.93	0.92	0.93	1.01
Measured Char	0.68		0.62	0.67	0.67	0.60	0.61	0.64
Adjusted Char *	0.51		0.47	0.50	0.50	0.45	0.46	0.48
Denominator	2.94		2.46	2.49	2.49	2.40	2.43	2.62
RSRM Liner Thickness	3.508		3.252	2.950	2.950	3.182	3.200	3.000
Margin of Safety	0.19		0.32	0.19	0.19	0.32	0.32	0.15
180 degrees								
Measured Erosion	1.20		0.93	0.93	0.93	0.89	0.94	1.02
Measured Char	0.71		0.72	0.65	0.65	0.63	0.57	0.58
Adjusted Char *	0.53		0.54	0.49	0.49	0.47	0.43	0.43
Denominator	3.07		2.54	2.47	2.37	2.41	2.58	2.61
RSRM Liner Thickness	3.508		3.252	2.950	2.950	3.182	3.200	3.000
Margin of Safety	0.14		0.28	0.19	0.19	0.34	0.33	0.17
270 degrees								
Measured Erosion	1.03		0.93	0.93	0.97	0.89	0.92	1.01
Measured Char	0.74		0.68	0.62	0.62	0.59	0.63	0.58
Adjusted Char *	0.56		0.51	0.47	0.47	0.44	0.47	0.43
Denominator	2.75		2.50	2.52	2.52	2.33	2.43	2.56
RSRM Liner Thickness	3.508		3.252	2.950	2.950	3.182	3.200	3.000
Margin of Safety	0.27		0.30	0.17	0.17	0.36	0.32	0.18

* Measured char adjusted to end of action time

$$\text{Margin of Safety} = \frac{\text{Minimum liner thickness}}{2.00 \times \text{erosion} + 1.25 \times \text{adj char}} - 1$$

Table D-VII. RSRM-28A Nose Cap Char and Erosion Data

Angular Location		Stations												
0 degrees	1.5	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	
Measured Erosion	NA	0.41	0.47	0.52	0.57	0.59	0.71	0.79	0.90	1.13	1.79	1.97	1.42	
	NA	0.58	0.54	0.49	0.52	0.52	0.47	0.48	0.46	0.50	0.68	0.68	0.74	
	NA	0.46	0.43	0.39	0.42	0.42	0.38	0.38	0.37	0.40	0.54	0.54	0.56	
	NA	1.40	1.48	1.53	1.66	1.70	1.89	2.06	2.26	2.76	4.26	4.62	3.53	
	NA	1.40	1.48	1.53	1.66	1.70	1.89	2.06	2.26	2.76	4.26	4.62	3.53	
	NA	1.40	1.48	1.53	1.66	1.70	1.89	2.06	2.26	2.76	4.26	4.62	3.53	
	NA	1.40	1.48	1.53	1.66	1.70	1.89	2.06	2.26	2.76	4.26	4.62	3.53	
RSRM Liner Thickness	1.776	2.038	2.248	2.458	2.668	2.878	3.088	3.298	3.507	4.055	4.713	4.691	3.863	
	NA	0.46	0.52	0.61	0.61	0.69	0.63	0.60	0.55	0.47	0.11	0.02	0.09	
	NA	0.46	0.52	0.61	0.61	0.69	0.63	0.60	0.55	0.47	0.11	0.02	0.09	
90 degrees	0.29	0.36	0.40	0.46	0.48	0.54	0.59	0.67	0.78	0.97	1.49	1.73	1.21	
	0.62	0.52	0.57	0.54	0.56	0.50	0.47	0.48	0.46	0.42	0.61	0.67	0.70	
	0.50	0.42	0.46	0.43	0.45	0.40	0.38	0.38	0.37	0.34	0.49	0.54	0.53	
	1.20	1.24	1.37	1.46	1.52	1.58	1.65	1.82	2.02	2.36	3.59	4.13	3.08	
	1.20	1.24	1.37	1.46	1.52	1.58	1.65	1.82	2.02	2.36	3.59	4.13	3.08	
	1.20	1.24	1.37	1.46	1.52	1.58	1.65	1.82	2.02	2.36	3.59	4.13	3.08	
	1.20	1.24	1.37	1.46	1.52	1.58	1.65	1.82	2.02	2.36	3.59	4.13	3.08	
RSRM Liner Thickness	1.776	2.038	2.248	2.458	2.668	2.878	3.088	3.298	3.507	4.055	4.713	4.691	3.863	
	0.48	0.64	0.64	0.68	0.76	0.82	0.87	0.81	0.74	0.72	0.31	0.14	0.26	
	0.48	0.64	0.64	0.68	0.76	0.82	0.87	0.81	0.74	0.72	0.31	0.14	0.26	
180 degrees	0.31	0.36	0.39	0.47	0.48	0.58	0.62	0.71	0.78	0.96	1.39	1.63	1.10	
	0.62	0.55	0.53	0.48	0.47	0.43	0.44	0.39	0.42	0.41	0.69	0.67	0.73	
	0.50	0.44	0.42	0.38	0.38	0.34	0.35	0.31	0.34	0.33	0.55	0.54	0.55	
	1.24	1.27	1.31	1.42	1.43	1.59	1.68	1.81	1.98	2.33	3.47	3.93	2.88	
	1.24	1.27	1.31	1.42	1.43	1.59	1.68	1.81	1.98	2.33	3.47	3.93	2.88	
	1.24	1.27	1.31	1.42	1.43	1.59	1.68	1.81	1.98	2.33	3.47	3.93	2.88	
	1.24	1.27	1.31	1.42	1.43	1.59	1.68	1.81	1.98	2.33	3.47	3.93	2.88	
RSRM Liner Thickness	1.776	2.038	2.248	2.458	2.668	2.878	3.088	3.298	3.507	4.055	4.713	4.691	3.863	
	0.43	0.60	0.72	0.73	0.87	0.81	0.84	0.82	0.77	0.74	0.36	0.19	0.34	
	0.43	0.60	0.72	0.73	0.87	0.81	0.84	0.82	0.77	0.74	0.36	0.19	0.34	
270 degrees	0.31	0.41	0.43	0.48	0.54	0.59	0.59	0.74	0.85	1.06	1.55	1.75	1.23	
	0.60	0.55	0.54	0.50	0.48	0.46	0.52	0.42	0.46	0.46	0.67	0.71	0.74	
	0.48	0.44	0.43	0.40	0.38	0.37	0.42	0.34	0.37	0.37	0.54	0.57	0.56	
	1.22	1.37	1.40	1.46	1.56	1.64	1.70	1.90	2.16	2.58	3.77	4.21	3.15	
	1.22	1.37	1.40	1.46	1.56	1.64	1.70	1.90	2.16	2.58	3.77	4.21	3.15	
	1.22	1.37	1.40	1.46	1.56	1.64	1.70	1.90	2.16	2.58	3.77	4.21	3.15	
	1.22	1.37	1.40	1.46	1.56	1.64	1.70	1.90	2.16	2.58	3.77	4.21	3.15	
RSRM Liner Thickness	1.776	2.038	2.248	2.458	2.668	2.878	3.088	3.298	3.507	4.055	4.713	4.691	3.863	
	0.46	0.49	0.61	0.68	0.71	0.75	0.82	0.74	0.62	0.57	0.25	0.11	0.22	
	0.46	0.49	0.61	0.68	0.71	0.75	0.82	0.74	0.62	0.57	0.25	0.11	0.22	

Minimum margin of safety is 0.02 at station 24.00 degree 0.00
Maximum margin of safety is 0.87 at station 14.00 degree 90.00

* Measured char adjusted to end of action time

Margin of Safety = $\frac{\text{minimum liner thickness}}{2.00 \times \text{erosion} + 1.25 \times \text{adj char}}$ - 1

Table D-VIII. RSRM-28B Nose Cap Char and Erosion Data

Angular Location	Stations													
0 degrees	1.5	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	
Measured Erosion	NA	0.36	0.37	0.46	0.51	0.52	0.55	0.67	0.78	0.96	1.43	1.65	1.14	
Measured Char	NA	0.58	0.52	0.54	0.49	0.51	0.52	0.42	0.42	0.42	0.65	0.75	0.82	
Adjusted Char *	NA	0.46	0.42	0.43	0.39	0.41	0.42	0.34	0.34	0.34	0.52	0.60	0.61	
Denominator	NA	1.30	1.26	1.46	1.51	1.55	1.62	1.76	1.98	2.34	3.51	4.05	3.05	
RSRM Liner Thickness	NA	2.038	2.248	2.458	2.668	2.878	3.088	3.298	3.507	4.055	4.713	4.691	3.863	
Margin of Safety	NA	0.57	0.78	0.68	0.77	0.86	0.91	0.87	0.77	0.73	0.34	0.16	0.27	
90 degrees														
Measured Erosion	NA	0.43	0.45	0.49	0.49	0.58	0.66	0.74	0.78	1.08	1.68	1.83	1.31	
Measured Char	NA	0.51	0.45	0.46	0.42	0.47	0.37	0.34	0.38	0.40	0.57	0.64	0.61	
Adjusted Char *	NA	0.41	0.36	0.37	0.34	0.38	0.30	0.27	0.30	0.32	0.46	0.51	0.46	
Denominator	NA	1.37	1.35	1.44	1.40	1.63	1.69	1.82	1.94	2.56	3.93	4.30	3.19	
RSRM Liner Thickness	NA	2.038	2.248	2.458	2.668	2.878	3.088	3.298	3.507	4.055	4.713	4.691	3.863	
Margin of Safety	NA	0.49	0.67	0.71	0.91	0.77	0.83	0.81	0.81	0.58	0.20	0.09	0.21	
180 degrees														
Measured Erosion	NA	0.36	0.38	0.49	0.49	0.58	0.66	0.74	0.78	1.08	1.68	1.83	1.31	
Measured Char	NA	0.50	0.46	0.46	0.42	0.47	0.37	0.34	0.38	0.40	0.57	0.64	0.61	
Adjusted Char *	NA	0.40	0.37	0.37	0.34	0.38	0.30	0.27	0.30	0.32	0.46	0.51	0.46	
Denominator	NA	1.22	1.22	1.44	1.40	1.63	1.69	1.82	1.94	2.56	3.93	4.30	3.19	
RSRM Liner Thickness	NA	2.038	2.248	2.458	2.668	2.878	3.088	3.298	3.507	4.055	4.713	4.691	3.863	
Margin of Safety	NA	0.67	0.84	0.71	0.91	0.77	0.83	0.81	0.81	0.58	0.20	0.09	0.21	
270 degrees														
Measured Erosion	NA	0.30	0.33	0.41	0.42	0.47	0.48	0.61	0.68	0.86	1.35	1.57	1.10	
Measured Char	NA	0.59	0.51	0.46	0.47	0.44	0.52	0.44	0.46	0.49	0.55	0.76	0.82	
Adjusted Char *	NA	0.47	0.41	0.37	0.38	0.35	0.42	0.35	0.37	0.39	0.44	0.61	0.61	
Denominator	NA	1.19	1.17	1.28	1.31	1.38	1.48	1.66	1.82	2.21	3.25	3.90	2.97	
RSRM Liner Thickness	NA	2.038	2.248	2.458	2.668	2.878	3.088	3.298	3.507	4.055	4.713	4.691	3.863	
Margin of Safety	NA	0.71	0.92	0.92	1.04	1.09	1.09	0.99	0.93	0.83	0.45	0.20	0.30	
Minimum margin of safety is 0.09 at station 24.00 degree 90.00														
Maximum margin of safety is 1.09 at station 14.00 degree 270.00														

Minimum margin of safety is 0.09 at station 24.00 degree 90.00
Maximum margin of safety is 1.09 at station 14.00 degree 270.00

* Measured char adjusted to end of action time

Margin of Safety = $\frac{\text{minimum liner thickness}}{2.00 \times \text{erosion} + 1.25 \times \text{adj char}}$ - 1

Table D-IX. RSRM-28A Cowl/OBR Char and Erosion Data

Angular Location	Stations										
	0	0.3	1.0	2.0	3.0	4.0	5.0	6.0	6.8	8.0	9.0
0 degrees											
Measured Erosion	0.30	0.36	0.40	0.43	0.44	0.38	0.30	NA	0.02	0.04	0.03
Measured Char	0.65	0.63	0.64	0.53	0.55	0.62	0.68	NA	1.07	0.94	0.91
Adjusted Char *	0.52	0.50	0.51	0.42	0.44	0.50	0.54	NA	0.86	0.75	0.73
Denominator	1.25	1.35	1.44	1.39	1.43	1.38	1.27	NA	1.31	1.19	1.14
RSRM Liner Thickness	1.438	1.499	1.577	1.655	1.733	1.811	1.889	NA	1.600	1.674	1.687
Margin of Safety	0.15	0.11	0.10	0.19	0.21	0.31	0.49	NA	0.22	0.41	0.48
11.3											
0.01											
0.93											
0.74											
1.13											
1.703											
0.51											
90 degrees											
Measured Erosion	0.27	0.29	0.28	0.31	0.31	0.29	0.22	NA	0.08	0.06	0.03
Measured Char	0.62	0.64	0.67	0.68	0.63	0.67	0.80	NA	0.93	0.84	0.80
Adjusted Char *	0.50	0.51	0.54	0.54	0.50	0.54	0.64	NA	0.74	0.67	0.64
Denominator	1.16	1.22	1.23	1.30	1.25	1.25	1.29	NA	1.24	1.10	1.01
RSRM Liner Thickness	1.438	1.499	1.577	1.655	1.733	1.811	1.889	NA	1.600	1.674	1.687
Margin of Safety	0.24	0.23	0.28	0.27	0.39	0.45	0.46	NA	0.29	0.52	0.68
0.04											
0.81											
0.65											
1.03											
1.703											
0.65											
180 degrees											
Measured Erosion	0.30	0.35	0.35	0.32	0.32	0.30	0.24	NA	0.02	0.02	0.00
Measured Char	0.50	0.51	0.59	0.65	0.66	0.68	0.75	NA	0.95	0.82	0.78
Adjusted Char *	0.40	0.41	0.47	0.52	0.53	0.54	0.60	NA	0.76	0.66	0.62
Denominator	1.10	1.21	1.29	1.29	1.30	1.28	1.26	NA	1.17	1.01	0.94
RSRM Liner Thickness	1.438	1.499	1.577	1.655	1.733	1.811	1.889	NA	1.600	1.674	1.687
Margin of Safety	0.31	0.24	0.22	0.28	0.33	0.41	0.50	NA	0.37	0.65	0.80
0.02											
0.78											
0.70											
1.09											
1.703											
0.57											
270 degrees											
Measured Erosion	0.28	0.31	0.33	0.35	0.35	0.33	0.25	NA	0.02	0.00	0.00
Measured Char	0.52	0.55	0.64	0.65	0.66	0.69	0.80	NA	0.85	0.81	0.87
Adjusted Char *	0.42	0.44	0.51	0.52	0.53	0.55	0.64	NA	0.68	0.65	0.70
Denominator	1.08	1.17	1.30	1.35	1.36	1.35	1.34	NA	1.05	0.97	1.01
RSRM Liner Thickness	1.438	1.499	1.577	1.655	1.733	1.811	1.889	NA	1.600	1.674	1.687
Margin of Safety	0.33	0.28	0.21	0.23	0.27	0.34	0.41	NA	0.52	0.72	0.67
0.63											

Minimum margin of safety is 0.10 at station 2.00 degree 0.00
Maximum margin of safety is 0.80 at station 10.00 degree 180.00

* Measured char adjusted to end of action time

$$\text{Margin of Safety} = \frac{\text{minimum liner thickness}}{1.50 \times \text{erosion} + 1.50 \times \text{adj char}} - 1$$

Table D-X. RSRM-28B Cowl/OBR Char and Erosion Data

Angular Location	Stations												
	0 degrees	0.3	1.0	2.0	3.0	4.0	5.0	6.0	6.8	8.0	9.0	10.0	11.3
90 degrees	Measured Erosion	0.23	0.29	0.33	0.33	0.35	0.34	NA	NA	0.01	0.04	0.03	0.00
	Measured Char	0.62	0.59	0.60	0.60	0.55	0.59	NA	NA	0.92	0.82	0.78	0.88
	Adjusted Char *	0.50	0.47	0.48	0.48	0.44	0.47	NA	NA	0.74	0.66	0.62	0.70
	Denominator	1.08	1.17	1.26	1.26	1.27	1.27	NA	NA	1.12	1.04	0.98	1.06
	RSRM Liner Thickness	1.438	1.499	1.577	1.577	1.655	1.733	NA	NA	1.600	1.674	1.687	1.703
	Margin of Safety	0.33	0.28	0.25	0.25	0.32	0.36	NA	NA	0.43	0.60	0.72	0.61
180 degrees	Measured Erosion	0.23	0.29	0.33	0.33	0.38	0.39	NA	NA	0.03	0.02	0.04	0.01
	Measured Char	0.63	0.63	0.65	0.65	0.61	0.62	NA	NA	0.99	0.96	0.88	0.90
	Adjusted Char *	0.50	0.50	0.52	0.52	0.49	0.50	NA	NA	0.79	0.77	0.70	0.72
	Denominator	1.09	1.21	1.31	1.31	1.37	1.40	NA	NA	1.23	1.18	1.12	1.09
	RSRM Liner Thickness	1.438	1.499	1.577	1.577	1.655	1.733	NA	NA	1.600	1.674	1.687	1.703
	Margin of Safety	0.32	0.24	0.20	0.20	0.21	0.24	NA	NA	0.30	0.42	0.51	0.56
270 degrees	Measured Erosion	0.23	0.24	0.29	0.29	0.29	0.29	NA	NA	NA	0.06	0.04	0.04
	Measured Char	0.68	0.66	0.64	0.64	0.63	0.59	NA	NA	NA	0.83	0.78	0.81
	Adjusted Char *	0.54	0.53	0.51	0.51	0.50	0.47	NA	NA	NA	0.66	0.62	0.65
	Denominator	1.14	1.14	1.22	1.22	1.21	1.17	NA	NA	NA	1.09	1.00	1.03
	RSRM Liner Thickness	1.438	1.499	1.577	1.577	1.655	1.733	NA	NA	1.600	1.674	1.687	1.703
	Margin of Safety	0.26	0.31	0.29	0.29	0.37	0.48	NA	NA	NA	0.54	0.69	0.65
	Measured Erosion	0.20	0.24	0.29	0.29	0.29	0.29	NA	NA	NA	NA	0.03	0.04
	Measured Char	0.68	0.66	0.64	0.64	0.63	0.59	NA	NA	NA	NA	0.88	0.98
	Adjusted Char *	0.54	0.53	0.51	0.51	0.50	0.47	NA	NA	NA	NA	0.70	0.78
	Denominator	1.08	1.14	1.22	1.22	1.21	1.17	NA	NA	NA	NA	1.10	1.24
	RSRM Liner Thickness	1.438	1.499	1.577	1.577	1.655	1.733	NA	NA	1.600	1.674	1.687	1.703
	Margin of Safety	0.33	0.31	0.29	0.29	0.37	0.48	NA	NA	NA	NA	0.53	0.38

Minimum margin of safety is 0.20 at station 2.00 degree 90.00
Maximum margin of safety is 0.72 at station 10.00 degree 0.00

* Measured char adjusted to end of action time

Margin of Safety = $\frac{\text{minimum liner thickness}}{1.50 \times \text{erosion} + 1.50 \times \text{adj char}}$ - 1

Table D-XI. RSRM-28A Fixed Housing Assembly Char and Erosion Data

Angular Location		Stations											
0	degrees	0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.75	
Measured Erosion		0.04	0.02	0.03	0.02	0.04	0.03	0.00	0.00	0.00	0.00	0.00	
Measured Char		1.13	1.06	0.93	0.94	0.88	0.87	0.87	0.88	0.81	0.72	1.84	
Adjusted Char *		0.90	0.85	0.74	0.75	0.70	0.70	0.70	0.70	0.65	0.58	1.47	
Denominator		1.21	1.10	0.99	0.98	0.96	0.93	0.87	0.88	0.81	0.72	1.84	
RSRM Liner Thickness		3.807	2.081	1.825	1.827	1.829	1.831	1.832	1.834	1.836	2.426	3.048	
Margin of Safety		2.15	0.89	0.84	0.86	0.91	0.97	1.11	1.08	1.27	2.37	0.66	
90 degrees													
Measured Erosion		0.06	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	
Measured Char		1.00	0.99	0.88	0.87	0.90	0.93	0.85	0.85	0.77	NA	NA	
Adjusted Char *		0.80	0.79	0.70	0.72	0.74	0.74	0.68	0.68	0.62	NA	NA	
Denominator		1.12	1.07	0.88	0.87	0.90	0.93	0.85	0.85	0.77	NA	NA	
RSRM Liner Thickness		3.807	2.081	1.825	1.827	1.829	1.831	1.832	1.834	1.836	2.426	3.048	
Margin of Safety		2.40	0.94	1.07	1.10	1.03	0.97	1.16	1.16	1.38	NA	NA	
180 degrees													
Measured Erosion		0.00	0.04	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	NA	
Measured Char		1.12	0.95	0.91	0.89	0.91	0.89	0.85	0.86	0.75	0.68	NA	
Adjusted Char *		0.90	0.76	0.73	0.71	0.73	0.71	0.68	0.69	0.60	0.54	NA	
Denominator		1.12	1.03	0.95	0.95	0.91	0.89	0.85	0.86	0.75	0.68	NA	
RSRM Liner Thickness		3.807	2.081	1.825	1.827	1.829	1.831	1.832	1.834	1.836	2.426	3.048	
Margin of Safety		2.40	1.02	0.92	0.92	1.01	1.06	1.16	1.13	1.45	2.57	NA	
270 degrees													
Measured Erosion		0.04	0.05	0.06	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.18	
Measured Char		1.28	1.01	1.01	1.00	0.94	0.93	0.90	0.88	0.73	0.64	1.46	
Adjusted Char *		1.02	0.81	0.81	0.80	0.75	0.74	0.72	0.70	0.58	0.51	1.17	
Denominator		1.36	1.11	1.13	1.06	1.00	0.97	0.90	0.88	0.73	0.64	1.82	
RSRM Liner Thickness		3.807	2.081	1.825	1.827	1.829	1.831	1.832	1.834	1.836	2.426	3.048	
Margin of Safety		1.80	0.87	0.62	0.72	0.83	0.89	1.04	1.08	1.52	2.79	0.67	

Minimum margin of safety is 0.62 at station 2.00 degree 270.00
Maximum margin of safety is 2.79 at station 9.00 degree 270.00

* Measured char adjusted to end of action time

Margin of Safety = $\frac{\text{Minimum liner thickness}}{2.00 \times \text{erosion} + 1.25 \times \text{adj char}^*} - 1$

Table D-XII. RSRM-28B Fixed Housing Assembly Char and Erosion Data

Angular Location	Stations									
	0 degrees	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00 10.75
Measured Erosion	0.10	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Measured Char	1.12	1.11	1.00	0.96	0.93	0.96	0.95	0.92	0.82	0.67
Adjusted Char *	0.90	0.89	0.80	0.77	0.74	0.77	0.76	0.74	0.66	0.54
Denominator	1.32	1.19	1.02	0.96	0.93	0.96	0.95	0.92	0.82	0.67
RSRM Liner Thickness	3.807	2.081	1.825	1.827	1.829	1.831	1.832	1.834	1.836	2.426
Margin of Safety	1.88	0.75	0.79	0.90	0.97	0.91	0.93	0.99	1.24	2.62
90 degrees										
Measured Erosion	0.10	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Measured Char	1.08	1.11	1.02	1.04	1.03	1.03	1.00	0.89	0.71	0.75
Adjusted Char *	0.86	0.89	0.82	0.83	0.82	0.82	0.80	0.71	0.57	0.60
Denominator	1.28	1.27	1.02	1.04	1.03	1.03	1.00	0.89	0.71	0.75
RSRM Liner Thickness	3.807	2.081	1.825	1.827	1.829	1.831	1.832	1.834	1.836	2.426
Margin of Safety	1.97	0.64	0.79	0.76	0.78	0.78	0.83	1.06	1.59	2.23
180 degrees										
Measured Erosion	0.10	0.04	0.04	0.04	0.02	0.03	0.03	0.03	0.00	0.00
Measured Char	1.00	1.00	0.92	0.90	0.91	0.88	0.89	0.84	0.85	0.78
Adjusted Char *	0.80	0.80	0.74	0.72	0.73	0.70	0.71	0.67	0.68	0.62
Denominator	1.20	1.08	1.00	0.98	0.95	0.94	0.95	0.90	0.85	0.78
RSRM Liner Thickness	3.807	2.081	1.825	1.827	1.829	1.831	1.832	1.834	1.836	2.426
Margin of Safety	2.17	0.93	0.82	0.86	0.93	0.95	0.93	1.04	1.16	2.11
270 degrees										
Measured Erosion	0.12	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Measured Char	1.13	1.02	0.99	1.04	1.01	1.03	0.92	0.92	0.80	0.98
Adjusted Char *	0.90	0.82	0.79	0.83	0.81	0.82	0.74	0.74	0.64	0.78
Denominator	1.37	1.08	0.99	1.04	1.01	1.03	0.92	0.92	0.80	0.98
RSRM Liner Thickness	3.807	2.081	1.825	1.827	1.829	1.831	1.832	1.834	1.836	2.426
Margin of Safety	1.78	0.93	0.84	0.76	0.81	0.78	0.99	0.99	1.29	1.48

Minimum margin of safety is 0.64 at station 1.00 degree 90.00
Maximum margin of safety is 2.62 at station 9.00 degree 0.00

* Measured char adjusted to end of action time

Margin of Safety = $\frac{\text{minimum liner thickness}}{2.00 \times \text{erosion} + 1.25 \times \text{adj char}}$ - 1

Table D-XIII. RSRM-28A Aft Exit Cone Assembly Char and Erosion Data

Angular Location	Stations									
	0 degrees	1.00	6.00	18.00	30.00	42.00	54.00	64.00	73.77	77.77
Measured Erosion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Measured Char	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Adjusted Char *	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Denominator	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RSRM Liner Thickness	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Margin of Safety	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
18 degrees										
Measured Erosion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Measured Char	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Adjusted Char *	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Denominator	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RSRM Liner Thickness	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Margin of Safety	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
30 degrees										
Measured Erosion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Measured Char	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Adjusted Char *	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Denominator	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RSRM Liner Thickness	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Margin of Safety	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90 degrees										
Measured Erosion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Measured Char	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Adjusted Char *	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Denominator	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RSRM Liner Thickness	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Margin of Safety	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
128 degrees										
Measured Erosion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Measured Char	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Adjusted Char *	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Denominator	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RSRM Liner Thickness	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Margin of Safety	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
180 degrees										
Measured Erosion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Measured Char	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Adjusted Char *	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Denominator	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RSRM Liner Thickness	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Margin of Safety	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-XIII. RSRM-28A Aft Exit Cone Assembly Char and Erosion Data (cont.)

Angular Location		Stations									
220 degrees		Measured Erosion	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Measured Char	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Adjusted Char *	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Denominator	NA	NA	NA	NA	NA	NA	NA	NA	NA
		RSRM Liner Thickness	NA	NA	NA	NA	NA	NA	NA	NA	1.095
		Margin of Safety	NA	NA	NA	NA	NA	NA	NA	NA	NA
255 degrees		Measured Erosion	NA	NA	NA	NA	NA	NA	NA	NA	0.12
		Measured Char	NA	NA	NA	NA	NA	NA	NA	NA	0.55
		Adjusted Char *	NA	NA	NA	NA	NA	NA	NA	NA	0.47
		Denominator	NA	NA	NA	NA	NA	NA	NA	NA	0.79
		RSRM Liner Thickness	NA	NA	NA	NA	NA	NA	NA	NA	1.095
		Margin of Safety	NA	NA	NA	NA	NA	NA	NA	NA	0.39
263 degrees		Measured Erosion	NA	NA	NA	NA	NA	NA	NA	NA	0.16
		Measured Char	NA	NA	NA	NA	NA	NA	NA	NA	0.59
		Adjusted Char *	NA	NA	NA	NA	NA	NA	NA	NA	0.50
		Denominator	NA	NA	NA	NA	NA	NA	NA	NA	0.90
		RSRM Liner Thickness	NA	NA	NA	NA	NA	NA	NA	NA	1.095
		Margin of Safety	NA	NA	NA	NA	NA	NA	NA	NA	0.22
270 degrees		Measured Erosion	NA	NA	NA	NA	NA	NA	NA	NA	0.15
		Measured Char	NA	NA	NA	NA	NA	NA	NA	NA	0.58
		Adjusted Char *	NA	NA	NA	NA	NA	NA	NA	NA	0.49
		Denominator	NA	NA	NA	NA	NA	NA	NA	NA	0.87
		RSRM Liner Thickness	NA	NA	NA	NA	NA	NA	NA	NA	1.095
		Margin of Safety	NA	NA	NA	NA	NA	NA	NA	NA	0.26
278 degrees		Measured Erosion	NA	NA	NA	NA	NA	NA	NA	NA	0.11
		Measured Char	NA	NA	NA	NA	NA	NA	NA	NA	0.64
		Adjusted Char *	NA	NA	NA	NA	NA	NA	NA	NA	0.54
		Denominator	NA	NA	NA	NA	NA	NA	NA	NA	0.87
		RSRM Liner Thickness	NA	NA	NA	NA	NA	NA	NA	NA	1.095
		Margin of Safety	NA	NA	NA	NA	NA	NA	NA	NA	0.26

Table D-XIII. RSRM-28A Aft Exit Cone Assembly Char and Erosion Data (cont.)

Minimum margin of safety is 0.22 at station 101.77 degree 263.00
Maximum margin of safety is 0.46 at station 107.77 degree 278.00

* Measured char adjusted to end of action time

Margin of Safety = $\frac{\text{minimum liner thickness}}{1.70 \times \text{erosion} + 1.25 \times \text{adj char}^*}$ - 1

Table D-XIII. RSRM-28A Aft Exit Cone Assembly Char and Erosion Data (cont.)

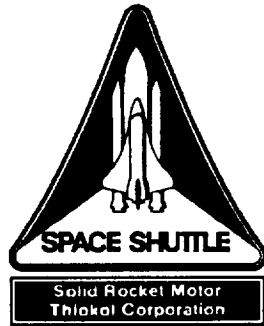
Angular Location	Stations	
0 degrees	107.77	113.77 118.77
Measured Erosion	NA	0.16 NA
Measured Char	NA	0.56 NA
Adjusted Char *	NA	0.48 NA
Denominator	NA	0.87 NA
RSRM Liner Thickness	1.131	1.160 NA
Margin of Safety	NA	0.34 NA
18 degrees		
Measured Erosion	0.17	0.18 NA
Measured Char	0.55	0.57 NA
Adjusted Char *	0.47	0.48 NA
Denominator	0.87	0.91 NA
RSRM Liner Thickness	1.131	1.160 NA
Margin of Safety	0.29	0.27 NA
30 degrees		
Measured Erosion	0.16	0.18 NA
Measured Char	0.50	0.54 NA
Adjusted Char *	0.42	0.46 NA
Denominator	0.80	0.88 NA
RSRM Liner Thickness	1.131	1.160 NA
Margin of Safety	0.41	0.32 NA
90 degrees		
Measured Erosion	NA	0.17 NA
Measured Char	NA	0.60 NA
Adjusted Char *	NA	0.51 NA
Denominator	NA	0.93 NA
RSRM Liner Thickness	1.131	1.160 NA
Margin of Safety	NA	0.25 NA
128 degrees		
Measured Erosion	NA	0.12 NA
Measured Char	NA	0.60 NA
Adjusted Char *	NA	0.51 NA
Denominator	NA	0.84 NA
RSRM Liner Thickness	1.131	1.160 NA
Margin of Safety	NA	0.38 NA
180 degrees		
Measured Erosion	0.12	0.12 NA
Measured Char	0.58	0.60 NA
Adjusted Char *	0.49	0.51 NA
Denominator	0.82	0.84 NA
RSRM Liner Thickness	1.131	1.160 NA
Margin of Safety	0.38	0.38 NA

Table D-XIII. RSRM-28A Aft Exit Cone Assembly Char and Erosion Data (cont.)

Angular Location	Stations	
220 degrees		
Measured Erosion	0.14	0.12 NA
Measured Char	0.56	0.63 NA
Adjusted Char *	0.48	0.54 NA
Denominator	0.83	0.87 NA
RSRM Liner Thickness	1.131	1.160 NA
Margin of Safety	0.36	0.33 NA
255 degrees		
Measured Erosion	0.15	0.15 NA
Measured Char	0.55	0.57 NA
Adjusted Char *	0.47	0.48 NA
Denominator	0.84	0.86 NA
RSRM Liner Thickness	1.131	1.160 NA
Margin of Safety	0.35	0.35 NA
263 degrees		
Measured Erosion	0.15	0.14 NA
Measured Char	0.51	0.55 NA
Adjusted Char *	0.43	0.47 NA
Denominator	0.80	0.82 NA
RSRM Liner Thickness	1.131	1.160 NA
Margin of Safety	0.42	0.41 NA
270 degrees		
Measured Erosion	0.16	0.16 NA
Measured Char	0.54	0.54 NA
Adjusted Char *	0.46	0.46 NA
Denominator	0.85	0.85 NA
RSRM Liner Thickness	1.131	1.160 NA
Margin of Safety	0.34	0.37 NA
278 degrees		
Measured Erosion	0.13	0.16 NA
Measured Char	0.51	0.61 NA
Adjusted Char *	0.43	0.52 NA
Denominator	0.76	0.92 NA
RSRM Liner Thickness	1.131	1.160 NA
Margin of Safety	0.48	0.26 NA

* Measured char adjusted to end of action time

Margin of Safety = $\frac{\text{minimum liner thickness}}{1.70 \times \text{erosion} + 1.25 \times \text{adj char}^*}$ - 1



Appendix E Insulation Postfire Data

Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

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Prepared for:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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Table E-1. RSRM-28A Nozzle-to-Case Joint Performance

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
0.0	5.625	4.265	1.360	3.6	4.1
21.6	5.612				
46.8	5.610	4.248	1.362	3.6	4.1
68.4	5.617				
90.0	5.618	4.930	0.688	7.1	8.2
111.6	5.618				
136.8	5.619	4.632	0.987	5.0	5.7
158.4	5.601				
180.0	5.621	4.333	1.288	3.8	4.4
201.6	5.624				
226.8	5.614	4.496	1.118	4.4	5.0
248.4	5.622				
270.0	5.624	4.538	1.086	4.5	5.2
291.6	5.622				
316.8	5.604	4.794	0.810	6.0	6.9
338.4	5.624				
	MEDIAN	MEDIAN	MEDIAN	MINIMUM	MINIMUM
	5.619	4.517	1.102	3.6	4.1

A SAFETY FACTOR OF 2.0 IS REQUIRED

A BLANK INDICATES THAT POSTFIRE DATA COLLECTION IS
NOT REQUIRED AT THAT LOCATION

Table E-II. RSRM-28A Aft Field Joint Performance

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
2.0	2.755	2.333	0.422	6.1	6.5
16.0	2.754				
30.0	2.753				
46.0	2.756	2.320	0.436	6.0	6.3
60.0	2.759				
76.0	2.753				
90.0	2.757	2.269	0.488	5.3	5.6
106.0	2.754				
120.0	2.758				
136.0	2.756	2.253	0.503	5.2	5.5
150.0	2.756				
166.0	2.754				
180.0	2.752	2.293	0.459	5.7	6.0
196.0	2.752				
210.0	2.755				
226.0	2.754	2.329	0.425	6.1	6.5
242.0	2.757				
256.0	2.754				
270.0	2.752	2.347	0.405	6.4	6.8
286.0	2.753				
300.0	2.757				
316.0	2.759	2.338	0.421	6.2	6.6
330.0	2.757				
346.0	2.754				
	MEDIAN 2.755	MEDIAN 2.325	MEDIAN 0.431	MINIMUM 5.2	MINIMUM 5.5

A SAFETY FACTOR OF 2.0 IS REQUIRED

A BLANK INDICATES THAT POSTFIRE DATA COLLECTION IS
NOT REQUIRED AT THAT LOCATION

Table E-III. RSRM-28A Center Field Joint Performance

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
2.0	2.695	2.620	0.075	34.6	35.9
16.0	2.703				
30.0	2.697				
46.0	2.741	2.646	0.095	27.3	28.9
60.0	2.712				
76.0	2.741				
90.0	2.695	2.555	0.140	18.5	19.3
106.0	2.702				
120.0	2.722				
136.0	2.742	2.563	0.179	14.5	15.3
150.0	2.764				
166.0	2.710				
180.0	2.741	2.593	0.148	17.5	18.5
196.0	2.713				
210.0	2.702				
226.0	2.709	2.588	0.121	21.4	22.4
242.0	2.724				
256.0	2.713				
270.0	2.711	2.567	0.144	18.0	18.8
286.0	2.715				
300.0	2.699				
316.0	2.694	2.593	0.101	25.7	26.7
330.0	2.701				
346.0	2.712				
	MEDIAN	MEDIAN	MEDIAN	MINIMUM	MINIMUM
	2.711	2.591	0.131	14.5	15.3

A SAFETY FACTOR OF 2.0 IS REQUIRED

A BLANK INDICATES THAT POSTFIRE DATA COLLECTION IS
NOT REQUIRED AT THAT LOCATION

Table E-IV. RSRM-28A Forward Field Joint Performance

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
2.0	2.732	2.610	0.122	21.3	22.4
16.0	2.735				
30.0	2.729				
46.0	2.730	2.568	0.162	16.0	16.9
60.0	2.736				
76.0	2.748				
90.0	2.750	2.580	0.170	15.3	16.2
106.0	2.730				
120.0	2.728				
136.0	2.715	2.618	0.097	26.8	28.0
150.0	2.713				
166.0	2.700				
180.0	2.725	2.583	0.142	18.3	19.2
196.0	2.760				
210.0	2.727				
226.0	2.732	2.591	0.141	18.4	19.4
242.0	2.730				
256.0	2.744				
270.0	2.741	2.625	0.116	22.4	23.6
286.0	2.730				
300.0	2.728				
316.0	2.729	2.608	0.121	21.4	22.6
330.0	2.737				
346.0	2.730				
	MEDIAN 2.730	MEDIAN 2.600	MEDIAN 0.132	MINIMUM 15.3	MINIMUM 16.2

A SAFETY FACTOR OF 2.0 IS REQUIRED

A BLANK INDICATES THAT POSTFIRE DATA COLLECTION IS
NOT REQUIRED AT THAT LOCATION

Table E-V. RSRM-28A Aft Dome Insulation Performance

STATION (IN)	COMPLIANCE SAFETY FACTOR (CSF)										REQUIRED S.F.
	0.0	46.8	90.0	136.8	180.0	226.8	270.0	316.8	DEGREE LOCATIONS MIN.	PLANE	
9.3	4.07	4.06	5.11	5.11	4.17	3.54	4.64	4.53	3.54	226.8	1.5
10.7	3.48	3.68	4.22	3.78	3.80	3.32	4.01	4.02	3.32	226.8	1.5
12.0	3.57	3.69	3.79	3.42	3.97	3.44	3.98	3.95	3.42	136.8	1.5
13.1	3.55	3.59	3.58	3.19	3.87	3.29	3.49	4.04	3.19	136.8	1.5
14.4	3.39	3.57	3.56	3.21	3.91	3.40	3.86	4.10	3.21	136.8	1.5
16.0	3.57	3.35	3.57	3.20	4.08	3.07	3.82	3.55	3.07	226.8	1.5
17.3	3.77	3.29	3.70	3.34	4.43	3.00	3.95	3.35	3.00	226.8	1.5
18.5	4.26	3.82	4.35	3.92	5.04	3.31	4.46	3.99	3.31	226.8	1.5
19.5	5.05	4.57	4.88	4.99	5.57	3.72	4.33	4.26	3.72	226.8	1.5
21.3	4.39	3.85	4.31	4.34	3.88	3.95	3.74	3.83	3.74	270.0	1.5
24.3	3.31	3.03	3.51	3.47	3.50	3.07	3.18	2.92	2.92	316.8	1.5
33.0	2.82	2.74	2.88	2.89	2.90	2.66	2.67	2.74	2.66	226.8	1.5
45.0	2.79	2.63	3.31	3.14	3.19	2.72	3.27	2.87	2.63	46.8	1.5
53.0	4.20	4.31	3.37	4.40	4.17	3.91	4.96	4.25	3.37	90.0	1.5
56.0	3.83	4.71	4.21	4.10	4.60	5.05	4.54	3.87	3.83	0.0	2.0
72.0	5.08	4.44	5.00	4.71	4.28	4.38	4.64	4.34	4.28	180.0	1.5
75.0	4.96	4.37	4.90	5.71	5.33	4.63	4.60	5.08	4.37	46.8	1.5
78.0	4.46	4.01	4.15	5.23	4.44	4.02	4.16	4.16	4.01	46.8	1.5

SEGMENT MINIMUM = 2.63 AT THE 45.0 INCH STATION

STATION (IN)	ACTUAL SAFETY FACTOR (ASF)										REQUIRED S.F.
	0.0	46.8	90.0	136.8	180.0	226.8	270.0	316.8	DEGREE LOCATIONS MIN.	PLANE	
9.3	4.37	4.29	5.52	5.58	4.57	3.85	5.04	4.88	3.85	226.8	1.5
10.7	3.72	3.99	4.50	4.12	4.16	3.63	4.36	4.32	3.63	226.8	1.5
12.0	3.84	4.04	4.07	3.75	4.37	3.79	4.36	4.27	3.75	136.8	1.5
13.1	3.83	3.94	3.86	3.52	4.30	3.62	3.94	4.35	3.52	136.8	1.5
14.4	3.57	3.77	3.48	4.26	3.64	4.15	4.32	3.48	3.37	226.8	1.5
16.0	3.82	3.72	3.86	3.54	4.58	3.37	4.17	3.85	3.39	226.8	1.5
17.3	4.14	3.77	4.15	3.74	5.09	3.39	4.42	3.75	3.39	226.8	1.5
18.5	4.76	4.42	4.94	4.41	5.87	3.78	5.06	4.52	3.78	226.8	1.5
19.5	5.71	5.32	5.66	5.69	6.52	4.33	4.96	4.93	4.33	226.8	1.5
21.3	5.03	4.45	5.01	5.02	4.57	4.59	4.33	4.48	4.33	270.0	1.5
24.3	3.74	3.50	4.04	3.97	4.05	3.57	3.69	3.41	3.41	316.8	1.5
33.0	2.98	2.97	3.09	3.14	3.12	2.90	2.89	2.93	2.89	270.0	1.5
45.0	3.13	2.93	3.60	3.43	3.53	3.14	3.59	3.13	2.93	46.8	1.5
53.0	4.67	4.74	3.74	4.90	4.68	4.47	5.40	4.75	3.74	90.0	1.5
56.0	4.57	5.54	5.01	4.97	5.54	6.07	5.40	4.60	4.57	0.0	2.0
72.0	5.26	4.63	5.20	4.99	4.51	4.54	4.82	4.43	4.43	316.8	1.5
75.0	5.16	4.63	5.19	6.09	5.64	4.96	4.84	5.33	4.63	46.8	1.5
78.0	4.87	4.40	4.67	5.80	4.94	4.48	4.65	4.56	4.40	46.8	1.5

SEGMENT MINIMUM = 2.89 AT THE 33.0 INCH STATION

Table E-V. RSRM-28A Aft Dome Insulation Performance (Cont.)

STATION (IN)	MATERIAL DECOMPOSITION DEPTH (MDD) INCHES										DESIGN M+3S
	0.0	46.8	90.0	136.8	180.0	226.8	270.0	316.8	MAX.	MEDIAN	
9.3	1.203	1.206	0.959	0.959	1.174	1.383	1.057	1.082	1.128	1.383	2.560
10.7	1.351	1.276	1.113	1.243	1.237	1.417	1.171	1.169	1.240	1.417	2.261
12.0	1.259	1.218	1.187	1.315	1.134	1.309	1.132	1.139	1.202	1.315	2.208
13.1	1.211	1.199	1.201	1.348	1.112	1.307	1.233	1.064	1.206	1.348	2.218
14.4	1.210	1.149	1.151	1.276	1.048	1.206	1.062	1.000	1.150	1.276	2.225
16.0	1.058	1.127	1.060	1.183	0.927	1.231	0.989	1.066	1.063	1.231	1.980
17.3	0.944	1.083	0.963	1.065	0.804	1.186	0.901	1.063	1.013	1.186	1.675
18.5	0.789	0.880	0.773	0.858	0.667	1.014	0.753	0.843	0.816	1.014	1.496
19.5	0.624	0.689	0.646	0.631	0.566	0.846	0.728	0.739	0.667	0.846	1.617
21.3	0.669	0.764	0.682	0.678	0.758	0.744	0.787	0.768	0.751	0.787	1.654
24.3	0.889	0.971	0.837	0.848	0.841	0.957	0.924	1.008	0.906	1.008	1.832
33.0	1.136	1.166	1.113	1.106	1.104	1.201	1.200	1.168	1.151	1.201	1.399
45.0	0.931	0.987	0.786	0.828	0.816	0.957	0.796	0.907	0.867	0.987	1.222
53.0	0.805	0.784	1.002	0.768	0.810	0.865	0.682	0.795	0.800	1.002	1.305
56.0	0.729	0.592	0.662	0.680	0.607	0.553	0.614	0.721	0.638	0.729	1.369
72.0	0.394	0.450	0.400	0.425	0.467	0.457	0.431	0.461	0.440	0.467	0.817
75.0	0.363	0.412	0.367	0.315	0.338	0.389	0.391	0.354	0.365	0.412	0.773
78.0	0.359	0.399	0.386	0.306	0.360	0.360	0.398	0.385	0.385	0.399	0.718

STATION (IN)	MATERIAL DECOMPOSITION RATE (MDR) MILS / SECOND										MOTOR ACTION TIME = 123.3 SECONDS
	0.0	46.8	90.0	136.8	180.0	226.8	270.0	316.8	AVE.	TIME	
9.3	9.8	9.8	7.8	7.8	9.6	11.3	8.6	8.8	9.2	122.5	
10.7	11.2	10.6	9.3	10.3	10.3	11.8	9.7	9.7	10.4	120.3	
12.0	10.7	10.4	10.1	11.2	9.7	11.2	9.7	9.7	10.3	117.3	
13.1	10.6	10.5	10.5	11.8	9.7	11.4	10.8	9.3	10.6	114.5	
14.4	10.8	10.3	10.3	11.4	9.4	10.8	9.5	9.0	10.2	111.7	
16.0	9.7	10.4	9.8	10.9	8.5	11.3	9.1	9.8	9.9	108.7	
17.3	8.9	10.2	9.1	10.1	7.6	11.2	8.5	10.1	9.5	105.7	
18.5	7.6	8.5	7.5	8.3	6.4	9.8	7.3	8.1	7.9	103.5	
19.5	6.1	6.8	6.4	6.2	5.6	8.3	7.2	7.3	6.7	101.5	
21.3	6.8	7.8	7.0	6.9	7.7	7.6	8.0	7.8	7.5	98.1	
24.3	9.4	10.3	8.9	9.0	8.9	10.2	9.8	10.7	9.7	94.1	
33.0	13.5	13.9	13.3	13.2	13.2	14.3	14.3	13.9	13.7	83.9	
45.0	12.4	13.1	10.4	11.0	10.8	12.7	10.6	12.0	11.6	75.3	
53.0	10.7	10.5	13.4	10.3	10.8	11.5	9.1	10.6	10.9	74.9	
56.0	9.8	7.9	8.9	9.1	8.1	7.4	8.2	9.7	8.6	74.7	
72.0	6.9	7.9	7.1	7.5	8.2	8.1	7.6	8.1	7.7	56.7	
75.0	7.1	8.1	7.2	6.2	6.7	7.7	7.7	7.0	7.2	50.8	
78.0	7.7	8.6	8.3	6.6	7.7	8.5	8.3	8.3	8.0	46.6	

Table E-V. RSRM-28A Aft Dome Insulation Performance (Cont.)

PART NO. 1U76668-02 SERIAL NO. 0000022		PREFIRE MEASUREMENTS INCHES		DEGREE LOCATIONS		MEDIAN		MDT	
STATION (IN)		0.0	46.8	90.0	136.8	180.0	226.8	270.0	316.8
9.3	5.260	5.171	5.289	5.355	5.366	5.326	5.324	5.285	5.171
10.7	5.032	5.085	5.011	5.124	5.140	5.142	5.104	5.049	5.011
12.0	4.838	4.921	4.834	4.928	4.952	4.958	4.932	4.864	4.834
13.1	4.633	4.721	4.641	4.745	4.786	4.733	4.862	4.631	4.631
14.4	4.321	4.434	4.342	4.445	4.469	4.395	4.403	4.324	4.321
16.0	4.041	4.197	4.091	4.185	4.246	4.150	4.120	4.103	4.041
17.3	3.910	4.086	3.996	3.987	4.096	4.022	3.979	3.981	3.910
18.5	3.757	3.890	3.817	3.788	3.916	3.836	3.809	3.812	3.757
19.5	3.564	3.666	3.655	3.593	3.689	3.661	3.613	3.643	3.564
21.3	3.363	3.403	3.419	3.404	3.467	3.415	3.407	3.442	3.363
24.3	3.327	3.399	3.379	3.369	3.407	3.420	3.407	3.442	3.327
33.0	3.385	3.460	3.437	3.478	3.444	3.481	3.472	3.421	3.385
45.0	2.914	2.887	2.833	2.840	2.879	3.003	2.854	2.843	2.833
53.0	3.761	3.717	3.749	3.767	3.787	3.864	3.681	3.775	3.681
56.0	3.334	3.279	3.319	3.382	3.362	3.354	3.316	3.314	3.279
72.0	2.071	2.083	2.081	2.121	2.106	2.075	2.079	2.041	2.041
75.0	1.873	1.908	1.903	1.918	1.908	1.930	1.894	1.886	1.873
78.0	1.750	1.756	1.804	1.774	1.780	1.783	1.789	1.756	1.750

PART NO. 1U76957-03 SERIAL NO. 0000013		POSTFIRE MEASUREMENTS INCHES		DEGREE LOCATIONS		MEDIAN	
STATION (IN)		0.0	46.8	90.0	136.8	180.0	226.8
9.3	4.057	3.965	4.330	4.396	4.192	3.943	4.267
10.7	3.681	3.809	3.898	3.881	3.903	3.725	3.933
12.0	3.579	3.703	3.647	3.613	3.818	3.649	3.800
13.1	3.422	3.522	3.440	3.397	3.674	3.426	3.629
14.4	3.111	3.285	3.191	3.169	3.421	3.189	3.341
16.0	2.983	3.070	3.031	3.002	3.319	2.919	3.131
17.3	2.966	3.003	3.033	2.922	3.292	2.836	3.078
18.5	2.968	3.010	3.044	2.930	3.249	2.822	3.056
19.5	2.940	2.977	3.009	2.962	3.123	2.815	2.904
21.3	2.694	2.639	2.737	2.726	2.709	2.671	2.620
24.3	2.438	2.428	2.542	2.521	2.566	2.463	2.434
33.0	2.249	2.294	2.324	2.372	2.340	2.280	2.272
45.0	1.983	1.900	2.047	2.012	2.063	1.846	2.058
53.0	2.956	2.933	2.747	2.999	2.977	2.999	2.980
56.0	2.605	2.687	2.657	2.702	2.755	2.801	2.702
72.0	1.677	1.633	1.681	1.696	1.639	1.618	1.648
75.0	1.510	1.496	1.536	1.603	1.570	1.541	1.503
78.0	1.391	1.357	1.418	1.468	1.420	1.385	1.404

Table E-VI. RSRM-28A Aft Cylinder Insulation Performance

STATION (IN)	COMPLIANCE SAFETY FACTOR (CSF)										REQUIRED S.F.
	0.0	46.8	90.0	136.8	180.0	226.8	270.0	316.8	MIN.	PLANE	
85.0	3.60	4.09	4.13	3.95	4.05	3.87	3.68	3.72	3.60	0.0	1.5
90.0	3.05	4.07	3.79	3.81	3.46	3.64	3.80	3.66	3.05	0.0	1.5
98.0	2.32	2.77	3.00	3.05	2.96	2.62	3.21	2.75	2.32	0.0	1.5
105.8	2.58	2.55	2.79	2.76	2.83	2.64	2.97	2.51	2.51	316.8	1.5
116.0	2.40	2.67	3.19	2.85	3.01	2.55	3.17	2.61	2.40	0.0	1.5
124.5	2.37	2.36	2.83	2.80	2.72	2.59	2.96	2.64	2.36	46.8	1.5
133.0	2.15	2.66	2.91	2.44	2.55	2.55	2.78	2.41	2.15	0.0	1.5
145.5	3.38	2.45	3.22	2.58	2.74	2.55	2.61	2.31	2.31	316.8	1.5
158.5	2.60	2.59	2.87	3.08	2.86	2.57	2.81	2.63	2.57	226.8	1.5
166.0	2.49	2.90	3.20	2.90	2.43	2.96	3.22	2.62	2.43	180.0	1.5
177.7	2.62	3.47	2.99	3.50	3.05	2.92	3.61	2.68	2.62	0.0	2.0
192.5	3.04	2.98	2.65	2.97	2.50	2.82	3.05	2.50	2.50	180.0	1.5
202.5	3.36	2.64	3.29	3.07	3.00	2.62	3.04	2.71	2.62	226.8	1.5
214.0	2.93	2.89	2.97	3.17	2.97	2.70	2.89	2.76	2.70	226.8	1.5
227.3	2.23	2.86	2.37	2.57	3.48	2.97	3.53	2.46	2.23	0.0	1.5
238.3	2.78	3.06	3.18	3.10	3.06	3.00	3.04	2.75	2.75	316.8	1.5
250.0	3.40	2.87	6.67	3.25	2.70	3.22	3.16	2.63	2.49	0.0	1.5
269.0	4.64	3.41	+	2.92	4.59	3.36	19.57	2.84	2.65	226.8	1.5
283.9	4.51	4.15	4.15	4.39	3.41	4.10	4.28	4.05	3.41	180.0	2.0
299.1	6.79	4.75	7.31	5.85	5.21	6.67	5.85	5.85	4.75	46.8	1.5
322.0	4.04	6.23	8.44	5.67	6.44	4.63	6.55	5.28	4.04	0.0	1.5
339.0	+	95.00	11.52	+	+	5.67	+	8.64	5.67	226.8	1.5
358.0	+	+	+	+	+	+	+	+	+	0.0	1.5
367.0	+	+	+	+	+	+	+	+	+	0.0	1.5
377.5	14.72	4.82	9.30	6.79	4.69	15.14	+	8.41	4.69	180.0	1.5

SEGMENT MINIMUM = 2.15 AT THE 133.0 INCH STATION
A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED

Table E-VI. RSRM-28A Aft Cylinder Insulation Performance (Cont.)

STATION (IN)	ACTUAL SAFETY FACTOR (ASF)										REQUIRED S.F.
	0.0	46.8	90.0	136.8	180.0	226.8	270.0	316.8	MIN.	PLANE	
85.0	4.18	4.73	4.79	4.81	4.64	4.47	4.25	4.39	4.18	0.0	1.5
90.0	3.53	4.56	4.26	4.46	3.83	4.04	4.23	4.06	3.53	0.0	1.5
98.0	3.08	3.49	3.81	3.84	3.69	3.33	4.01	3.44	3.08	0.0	1.5
105.8	2.76	2.67	2.95	2.89	2.95	2.77	3.10	2.64	2.64	316.8	1.5
116.0	2.55	2.77	3.31	2.95	3.10	2.68	3.32	2.70	2.55	0.0	1.5
124.5	2.59	2.54	2.96	2.90	2.84	2.77	3.10	2.74	2.54	46.8	1.5
133.0	2.69	3.18	3.39	2.95	2.98	3.03	3.29	2.88	2.69	0.0	1.5
145.5	3.49	2.54	3.37	2.65	2.82	2.62	2.65	2.37	2.37	316.8	1.5
158.5	2.74	2.70	2.99	3.19	2.97	2.72	2.87	2.72	2.70	46.8	1.5
166.0	3.10	3.37	3.80	3.51	3.10	3.57	3.84	3.12	3.10	0.0	1.5
177.7	4.00	5.18	4.61	5.24	4.59	4.36	5.45	4.03	4.00	0.0	2.0
192.5	3.68	3.52	3.33	3.55	3.15	3.35	3.56	3.00	3.00	316.8	1.5
202.5	3.41	2.70	3.36	3.15	3.08	2.67	3.08	2.75	2.67	226.8	1.5
214.0	2.97	2.92	3.07	3.22	3.02	2.73	2.90	2.81	2.73	226.8	1.5
227.3	2.80	3.37	3.09	3.13	4.19	3.63	4.29	2.98	2.80	0.0	1.5
238.3	2.85	3.16	3.27	3.39	3.18	3.16	3.18	2.83	2.83	316.8	1.5
250.0	2.64	2.96	3.38	3.02	2.80	3.35	3.21	2.73	2.64	0.0	1.5
269.0	4.05	3.34	7.96	3.75	5.11	3.17	4.93	3.44	3.17	226.8	1.5
283.9	5.24	3.64	+	3.18	5.14	3.67	20.96	3.13	3.13	316.8	1.5
299.1	7.37	6.61	6.75	7.16	5.62	6.45	6.99	6.50	5.62	180.0	2.0
322.0	7.45	5.11	7.90	6.42	5.81	7.32	6.43	6.32	5.11	46.8	1.5
339.0	4.49	6.66	9.22	6.15	7.14	5.07	7.24	5.75	4.49	0.0	1.5
358.0	+	+	12.85	+	+	6.37	+	9.57	6.37	226.8	1.5
367.0	+	+	+	+	+	+	+	+	+	0.0	1.5
377.5	18.14	6.07	11.26	8.46	6.15	16.91	+	10.02	6.07	46.8	1.5

SEGMENT MINIMUM = 2.37 AT THE 145.5 INCH STATION

A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED

Table E-VI. RSRM-28A Aft Cylinder Insulation Performance (Cont.)

STATION (IN)	MATERIAL DECOMPOSITION DEPTH (MDD) INCHES										DEGREE LOCATIONS		DESIGN	
	0.0	46.8	90.0	136.8	180.0	226.8	270.0	316.8	MEDIAN	MAX.	M+3S	M+3S	M+3S	M+3S
85.0	0.361	0.318	0.315	0.329	0.321	0.336	0.353	0.349	0.332	0.361	0.361	0.618	0.576	0.576
90.0	0.415	0.311	0.334	0.332	0.366	0.348	0.333	0.346	0.340	0.415	0.415	0.582	0.582	0.582
98.0	0.490	0.410	0.378	0.372	0.384	0.433	0.354	0.413	0.397	0.490	0.490	0.559	0.559	0.559
105.8	0.418	0.423	0.387	0.391	0.382	0.409	0.364	0.431	0.400	0.431	0.431	0.527	0.527	0.527
116.0	0.437	0.393	0.329	0.368	0.349	0.411	0.331	0.402	0.381	0.437	0.437	0.522	0.522	0.522
124.5	0.434	0.437	0.364	0.368	0.378	0.398	0.348	0.390	0.384	0.437	0.437	0.516	0.516	0.516
133.0	0.456	0.368	0.337	0.402	0.385	0.385	0.353	0.407	0.385	0.402	0.402	0.493	0.493	0.493
145.5	0.275	0.379	0.289	0.361	0.340	0.365	0.357	0.402	0.359	0.402	0.402	0.491	0.491	0.491
158.5	0.338	0.340	0.307	0.286	0.308	0.343	0.313	0.334	0.324	0.343	0.343	0.466	0.466	0.466
166.0	0.341	0.293	0.266	0.293	0.350	0.287	0.264	0.324	0.293	0.350	0.350	0.452	0.452	0.452
177.7	0.382	0.288	0.334	0.286	0.328	0.343	0.277	0.373	0.331	0.382	0.382	0.400	0.400	0.400
192.5	0.257	0.262	0.294	0.263	0.312	0.277	0.256	0.312	0.270	0.312	0.312	0.376	0.376	0.376
202.5	0.217	0.277	0.222	0.238	0.243	0.279	0.242	0.254	0.240	0.279	0.279	0.351	0.351	0.351
214.0	0.239	0.242	0.236	0.221	0.236	0.259	0.242	0.254	0.240	0.259	0.259	0.317	0.317	0.317
227.3	0.291	0.227	0.274	0.253	0.187	0.219	0.184	0.264	0.207	0.229	0.229	0.331	0.331	0.331
238.3	0.227	0.206	0.198	0.191	0.206	0.210	0.207	0.229	0.207	0.229	0.229	0.285	0.285	0.285
250.0	0.221	0.190	0.169	0.187	0.204	0.171	0.174	0.209	0.189	0.221	0.221	0.251	0.251	0.251
269.0	0.147	0.174	0.075	0.154	0.117	0.189	0.123	0.176	0.115	0.158	0.158	0.197	0.197	0.197
283.9	0.097	0.132	0	0.154	0.098	0.134	0.023	0.158	0.163	0.198	0.198	0.253	0.253	0.253
299.1	0.150	0.163	0.163	0.154	0.198	0.165	0.158	0.167	0.163	0.198	0.198	0.197	0.197	0.197
322.0	0.056	0.080	0.052	0.065	0.073	0.057	0.065	0.065	0.065	0.080	0.080	0.190	0.190	0.190
339.0	0.094	0.061	0.045	0.067	0.059	0.082	0.058	0.072	0.064	0.094	0.094	0.181	0.181	0.181
358.0	0	0.004	0.033	0	0	0.067	0	0.044	0.002	0.067	0.067	0.175	0.175	0.175
367.0	0	0	0	0	0	0	0	0	0	0	0	0.237	0.237	0.237
377.5	0.036	0.110	0.057	0.078	0.113	0.035	0	0.063	0.060	0.113	0.113	0.237	0.237	0.237

Table E-VI. RSRM-28A Aft Cylinder Insulation Performance (Cont.)

STATION (IN)	MATERIAL DECOMPOSITION RATE (MDR) MILS / SECOND										DEGREE LOCATION EXPOSURE AVE. TIME	
	0.0	46.8	90.0	136.8	180.0	226.8	270.0	316.8				
85.0	8.0	7.0	7.0	7.3	7.1	7.4	7.8	7.7	7.4	45.2		
90.0	9.3	7.0	7.5	7.4	8.2	7.8	7.5	7.8	7.8	44.6		
98.0	11.2	9.4	8.7	8.5	8.8	9.9	8.1	9.5	9.3	43.6		
105.8	9.8	9.9	9.0	9.1	8.9	9.6	8.5	10.1	9.4	42.8		
116.0	10.4	9.4	7.8	8.8	8.3	9.8	7.9	9.6	9.0	42.0		
124.5	10.6	10.7	8.9	9.0	9.2	9.7	8.5	9.5	9.5	41.0		
133.0	11.5	9.2	8.5	10.1	9.7	9.7	8.9	10.2	9.7	39.8		
145.5	7.3	10.0	7.6	9.6	9.0	9.7	9.4	10.6	9.2	37.8		
158.5	9.3	9.4	8.5	7.9	8.5	9.5	8.6	9.2	8.9	36.2		
166.0	9.5	8.2	7.4	8.2	9.8	8.0	7.4	9.1	8.4	35.8		
177.7	11.1	8.4	9.7	8.3	9.5	10.0	8.1	10.8	9.5	34.4		
192.5	8.2	8.4	9.4	8.4	10.0	8.9	8.2	10.0	8.9	31.2		
202.5	7.3	9.3	7.4	8.0	8.2	9.4	8.1	9.0	8.3	29.8		
214.0	8.5	8.6	8.4	7.9	8.4	9.3	8.6	9.1	8.6	28.0		
227.3	11.2	8.7	10.5	9.7	7.2	8.4	7.1	10.2	9.1	26.0		
238.3	9.3	8.4	8.1	7.8	8.4	8.6	8.5	9.4	8.6	24.4		
250.0	9.7	8.3	7.4	8.2	8.9	7.5	7.6	9.2	8.4	22.8		
269.0	7.4	8.8	3.8	7.8	5.9	9.5	6.2	8.9	7.3	19.8		
283.9	5.7	7.8	0	9.1	5.8	7.9	1.4	9.3	5.9	17.0		
299.1	8.5	9.3	9.3	8.8	11.3	9.4	9.0	9.5	9.4	17.6		
322.0	4.4	6.3	4.1	5.1	5.7	4.5	5.1	5.1	5.0	12.8		
339.0	7.7	5.0	3.7	5.5	4.8	6.7	4.8	5.9	5.5	12.2		
358.0	0	0.4	2.9	0	0	5.9	0	3.9	1.6	11.4		
367.0	0	0	0	0	0	0	0	0	0	11.0		
377.5	1.8	5.4	2.8	3.8	5.5	1.7	0	3.1	3.0	20.4		

MOTOR ACTION TIME = 123.3 SECONDS

Table E-VI. RSRM-28A Aft Cylinder Insulation Performance (Cont.)

STATION (IN)	PRETIRE MEASUREMENTS									
	INCHES									
	DEGREE LOCATIONS									
	0.0	46.8	90.0	136.8	180.0	226.8	270.0	316.8	MIN.	MDT
85.0	1.509	1.503	1.510	1.582	1.488	1.503	1.502	1.531	1.488	1.506
90.0	1.466	1.417	1.422	1.480	1.400	1.407	1.410	1.404	1.400	1.265
98.0	1.507	1.432	1.442	1.427	1.416	1.444	1.420	1.419	1.416	1.135
105.8	1.154	1.130	1.143	1.131	1.127	1.134	1.130	1.136	1.127	1.080
116.0	1.115	1.088	1.090	1.086	1.082	1.102	1.099	1.087	1.082	1.050
124.5	1.172	1.110	1.077	1.068	1.072	1.101	1.080	1.070	1.068	1.030
133.0	1.225	1.171	1.143	1.187	1.147	1.168	1.160	1.174	1.143	0.980
145.5	0.961	0.963	0.973	0.957	0.958	0.957	0.947	0.952	0.947	0.930
158.5	0.927	0.919	0.919	0.911	0.914	0.932	0.897	0.908	0.897	0.880
166.0	1.057	0.987	1.011	1.028	1.085	1.026	1.014	1.012	0.987	0.850
177.7	1.528	1.493	1.539	1.499	1.505	1.497	1.511	1.503	1.493	1.000
192.5	0.946	0.923	0.978	0.934	0.982	0.927	0.912	0.936	0.912	0.780
202.5	0.741	0.749	0.747	0.749	0.748	0.744	0.738	0.739	0.738	0.730
214.0	0.710	0.706	0.724	0.712	0.712	0.708	0.701	0.714	0.701	0.700
227.3	0.814	0.764	0.848	0.792	0.783	0.795	0.789	0.788	0.764	0.650
238.3	0.646	0.651	0.648	0.647	0.656	0.664	0.658	0.649	0.646	0.630
250.0	0.583	0.563	0.571	0.565	0.571	0.573	0.558	0.570	0.558	0.550
269.0	0.595	0.582	0.597	0.578	0.598	0.599	0.606	0.605	0.578	0.500
283.9	0.508	0.480	0.492	0.489	0.504	0.492	0.482	0.495	0.480	0.450
299.1	1.106	1.077	1.101	1.103	1.112	1.065	1.105	1.085	1.065	0.676
322.0	0.417	0.409	0.411	0.417	0.424	0.417	0.418	0.411	0.409	0.380
339.0	0.422	0.406	0.415	0.412	0.421	0.416	0.420	0.414	0.406	0.380
358.0	0.412	0.432	0.424	0.415	0.431	0.427	0.426	0.421	0.412	0.380
367.0	0.441	0.406	0.417	0.417	0.419	0.419	0.440	0.434	0.406	0.419
377.5	0.653	0.668	0.642	0.660	0.695	0.592	0.635	0.631	0.592	0.530

Table E-VI. RSRM-28A Aft Cylinder Insulation Performance (Cont.)

STATION (IN)	POSTFIRE MEASUREMENTS INCHES									
	DEGREE LOCATIONS									
	0.0	46.8	90.0	136.8	180.0	226.8	270.0	316.8	MIN.	MEDIAN
85.0	1.148	1.185	1.195	1.253	1.167	1.167	1.149	1.182	1.148	1.175
90.0	1.051	1.106	1.088	1.148	1.034	1.059	1.077	1.058	1.034	1.068
98.0	1.017	1.022	1.064	1.055	1.032	1.011	1.066	1.006	1.006	1.027
105.8	0.736	0.707	0.756	0.740	0.745	0.725	0.766	0.705	0.705	0.738
116.0	0.678	0.695	0.761	0.718	0.733	0.691	0.768	0.685	0.678	0.706
124.5	0.688	0.673	0.713	0.700	0.694	0.703	0.732	0.680	0.673	0.697
133.0	0.769	0.803	0.806	0.785	0.762	0.783	0.807	0.767	0.762	0.784
145.5	0.686	0.584	0.684	0.596	0.618	0.592	0.590	0.550	0.550	0.594
158.5	0.589	0.579	0.612	0.625	0.606	0.589	0.584	0.574	0.574	0.589
166.0	0.716	0.694	0.745	0.735	0.735	0.739	0.750	0.688	0.688	0.735
177.7	1.146	1.205	1.205	1.213	1.177	1.154	1.234	1.130	1.130	1.191
192.5	0.689	0.661	0.684	0.671	0.670	0.650	0.656	0.624	0.624	0.666
202.5	0.524	0.472	0.525	0.511	0.505	0.465	0.498	0.470	0.465	0.502
214.0	0.471	0.464	0.488	0.491	0.476	0.449	0.459	0.460	0.449	0.468
227.3	0.523	0.537	0.574	0.539	0.596	0.576	0.605	0.524	0.523	0.557
238.3	0.419	0.445	0.450	0.456	0.450	0.454	0.451	0.420	0.419	0.450
250.0	0.362	0.373	0.402	0.378	0.367	0.402	0.384	0.361	0.361	0.375
269.0	0.448	0.408	0.522	0.424	0.481	0.410	0.483	0.429	0.408	0.439
283.9	0.411	0.348	0.524	0.335	0.406	0.358	0.459	0.337	0.335	0.382
299.1	0.956	0.914	0.938	0.949	0.914	0.900	0.947	0.918	0.900	0.928
322.0	0.361	0.329	0.359	0.352	0.351	0.360	0.353	0.346	0.329	0.352
339.0	0.328	0.345	0.370	0.345	0.362	0.334	0.362	0.342	0.328	0.345
358.0	0.432	0.428	0.391	0.434	0.431	0.360	0.435	0.377	0.360	0.430
367.0	0.454	0.431	0.454	0.433	0.462	0.456	0.517	0.450	0.431	0.454
377.5	0.617	0.558	0.585	0.582	0.582	0.557	0.641	0.568	0.557	0.582

Table E-VII. RSRM-28A Aft Center Segment Insulation Performance

STATION (IN)	COMPLIANCE SAFETY FACTOR (CSF)										REQUIRED S.F.
	0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MIN.	PLANE	
3.5	3.49	4.64	6.84	4.96	4.23	4.30	4.99	4.71	3.49	0.0	2.0
11.0	4.23	2.23	4.05	2.59	3.73	3.55	3.63	2.92	2.23	46.0	1.5
30.7	3.07	3.12	3.42	4.93	2.76	3.91	4.30	3.44	2.76	180.0	1.5
36.2	4.17	4.08	4.35	6.59	3.21	5.17	5.41	4.35	3.21	180.0	1.5
44.6	4.50	9.23	7.20	7.20	6.10	20.00	8.57	11.25	4.50	0.0	1.5
71.5	5.48	3.78	5.00	4.05	7.39	28.33	6.07	5.48	3.78	46.0	1.5
126.0	6.82	5.00	+	4.41	5.36	7.14	10.00	7.50	4.41	136.0	1.5
145.0	5.77	7.50	8.33	3.33	5.17	12.50	5.56	4.17	3.33	136.0	1.5
161.4	10.73	3.93	4.54	7.37	3.93	11.24	2.88	3.63	2.88	270.0	2.0
163.0	3.69	3.19	3.15	5.36	2.99	3.87	3.19	3.03	2.99	180.0	2.0
178.0	6.19	5.42	4.48	6.84	4.48	14.44	4.33	32.50	4.33	270.0	1.5
214.1	+	5.42	8.13	5.91	7.22	18.57	+	6.19	5.42	46.0	1.5
280.0	+	+	+	+	+	+	+	+	+	0.0	1.5
298.0	+	+	+	+	+	+	+	+	+	0.0	1.5
311.8	+	+	+	+	+	+	+	+	+	0.0	1.5

SEGMENT MINIMUM = 2.23 AT THE 11.0 INCH STATION
A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED

STATION (IN)	ACTUAL SAFETY FACTOR (ASF)										REQUIRED S.F.
	0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MIN.	PLANE	
3.5	4.48	5.74	8.21	6.27	5.40	5.42	6.25	5.93	4.48	0.0	2.0
11.0	5.17	3.03	5.09	3.50	4.78	4.46	4.97	3.74	3.03	46.0	1.5
30.7	3.41	3.39	3.77	5.64	3.11	4.24	4.81	3.44	3.11	180.0	1.5
36.2	5.63	5.35	5.86	8.79	4.35	6.74	7.28	5.81	4.35	180.0	1.5
44.6	5.05	9.36	7.60	7.32	6.39	20.50	9.00	11.50	5.05	0.0	1.5
71.5	6.13	4.27	5.44	4.57	8.00	31.67	6.43	6.03	4.27	46.0	1.5
126.0	7.18	5.17	+	4.62	5.46	7.48	10.13	7.60	4.62	136.0	1.5
145.0	6.31	7.80	8.94	3.51	5.69	13.50	6.00	4.39	3.51	136.0	1.5
161.4	25.77	9.87	11.23	18.47	8.85	26.05	7.38	8.89	7.38	270.0	2.0
163.0	8.59	7.43	7.33	12.50	6.96	9.02	7.43	7.05	6.96	180.0	2.0
178.0	9.33	8.33	6.72	10.11	6.79	22.00	6.60	48.75	6.60	270.0	1.5
214.1	+	5.79	8.69	6.14	7.44	19.57	+	6.48	5.79	46.0	1.5
280.0	+	+	+	+	+	+	+	+	+	0.0	1.5
298.0	+	+	+	+	+	+	+	+	+	0.0	1.5
311.8	+	+	+	+	+	+	+	+	+	0.0	1.5

SEGMENT MINIMUM = 3.03 AT THE 11.0 INCH STATION
A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED

Table E-VII. RSRM-28A Aft Center Segment Insulation Performance (Cont.)

STATION (IN)	MATERIAL DECOMPOSITION DEPTH (MDD) INCHES										DESIGN M+35
	0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MEDIAN	MAX.	
3.5	0.608	0.457	0.310	0.427	0.501	0.493	0.425	0.450	0.453	0.608	1.067
11.0	0.449	0.553	0.469	0.733	0.510	0.535	0.524	0.651	0.530	0.853	0.829
30.7	0.252	0.248	0.226	0.157	0.280	0.198	0.180	0.225	0.225	0.280	0.484
36.2	0.144	0.147	0.138	0.091	0.187	0.116	0.111	0.138	0.138	0.187	0.318
44.6	0.080	0.039	0.050	0.050	0.059	0.018	0.042	0.032	0.046	0.080	0.090
71.5	0.031	0.045	0.034	0.042	0.023	0.006	0.028	0.031	0.031	0.045	0.086
126.0	0.022	0.030	0	0.034	0.028	0.021	0.015	0.020	0.021	0.034	0.074
145.0	0.026	0.020	0.018	0.045	0.029	0.012	0.027	0.036	0.027	0.045	0.063
161.4	0.022	0.060	0.052	0.032	0.060	0.021	0.082	0.065	0.056	0.082	0.082
163.0	0.064	0.074	0.075	0.044	0.079	0.061	0.074	0.078	0.074	0.079	0.082
178.0	0.021	0.024	0.029	0.019	0.029	0.009	0.030	0.004	0.023	0.030	0.065
214.1	0	0.024	0.016	0.022	0.018	0.007	0	0.021	0.017	0.024	0.029
280.0	0	0	0	0	0	0	0	0	0	0	0.005
298.0	0	0	0	0	0	0	0	0	0	0	0.005
311.8	0	0	0	0	0	0	0	0	0	0	0.003

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA

STATION (IN)	MATERIAL DECOMPOSITION RATE (MDR) MILS / SECOND										EXPOSURE TIME
	0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	AVE.	TIME	
3.5	5.4	4.1	2.8	3.8	4.5	4.4	3.8	4.0	4.1	112.1	
11.0	4.6	8.7	4.8	7.5	5.2	5.5	5.4	6.7	6.1	97.5	
30.7	5.3	5.2	4.7	3.3	5.9	4.2	3.8	4.7	4.6	47.6	
36.2	4.4	4.5	4.2	2.8	5.7	3.6	3.4	4.2	4.1	32.6	
44.6	6.7	3.3	4.2	4.2	4.9	1.5	3.5	2.7	3.9	12.0	
71.5	3.0	4.4	3.3	4.1	2.3	0.6	2.7	3.0	2.9	10.2	
126.0	2.5	3.4	0	3.9	3.2	2.4	1.7	2.3	2.4	8.8	
145.0	3.5	2.7	2.4	6.1	3.9	1.6	3.6	4.9	3.6	7.4	
161.4	2.2	6.0	5.2	3.2	6.0	2.1	8.2	6.5	4.9	10.0	
163.0	6.4	7.4	7.5	4.4	7.9	6.1	7.4	7.8	6.9	10.0	
178.0	3.5	4.0	4.8	3.2	4.8	1.5	5.0	0.7	3.4	6.0	
214.1	0	4.0	2.7	3.7	3.0	1.2	0	3.5	2.3	6.0	
280.0	0	0	0	0	0	0	0	0	0	3.4	
298.0	0	0	0	0	0	0	0	0	0	2.8	
311.8	0	0	0	0	0	0	0	0	0	2.0	

MOTOR ACTION TIME = 123.3 SECONDS

Table E-VII. RSRM-28A Aft Center Segment Insulation Performance (Cont.)

PART NO. 1U76667-02		PREFIRE MEASUREMENTS									
SERIAL NO. 0000059		INCHES									
STATION (IN)		DEGREE LOCATIONS									
		0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MIN.	MDT
3.5	2.723	2.623	2.546	2.679	2.706	2.674	2.655	2.669	2.546	2.671	2.120
11.0	2.323	2.585	2.389	2.563	2.437	2.387	2.603	2.434	2.323	2.436	1.900
30.7	0.859	0.841	0.851	0.886	0.870	0.840	0.866	0.863	0.840	0.861	0.774
36.2	0.811	0.787	0.809	0.800	0.814	0.782	0.808	0.802	0.782	0.805	0.600
44.6	0.404	0.365	0.380	0.366	0.377	0.369	0.378	0.368	0.365	0.373	0.360
71.5	0.190	0.192	0.185	0.192	0.184	0.190	0.180	0.187	0.152	0.189	0.170
126.0	0.158	0.155	0.158	0.157	0.153	0.157	0.152	0.152	0.152	0.156	0.150
145.0	0.164	0.156	0.161	0.158	0.165	0.162	0.162	0.158	0.156	0.162	0.150
161.4	0.567	0.592	0.584	0.591	0.531	0.547	0.605	0.578	0.531	0.581	0.236
163.0	0.550	0.550	0.550	0.550	0.550	0.550	0.550	0.550	0.550	0.550	0.236
178.0	0.196	0.200	0.195	0.192	0.197	0.198	0.198	0.195	0.192	0.197	0.130
214.1	0.133	0.139	0.139	0.135	0.134	0.137	0.137	0.136	0.133	0.137	0.130
280.0	0.093	0.106	0.098	0.102	0.094	0.114	0.092	0.136	0.092	0.100	0.090
298.0	0.115	0.113	0.099	0.110	0.097	0.109	0.117	0.096	0.096	0.109	0.090
311.8	0.114	0.095	0.107	0.104	0.109	0.105	0.104	0.104	0.095	0.105	0.090

PART NO. 1U76791-01		POSTFIRE MEASUREMENTS									
SERIAL NO. 0000026		INCHES									
STATION (IN)		DEGREE LOCATIONS									
		0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MIN.	MEDIAN
3.5	2.115	2.166	2.236	2.252	2.205	2.181	2.230	2.219	2.115	2.212	
11.0	1.674	1.732	1.920	1.830	1.927	1.852	2.079	1.783	1.732	1.863	
30.7	0.607	0.593	0.625	0.729	0.590	0.642	0.686	0.638	0.590	0.632	
36.2	0.667	0.640	0.671	0.709	0.627	0.666	0.697	0.664	0.627	0.667	
44.6	0.324	0.326	0.330	0.316	0.318	0.351	0.336	0.336	0.316	0.328	
71.5	0.159	0.147	0.151	0.150	0.161	0.184	0.152	0.156	0.147	0.154	
126.0	0.136	0.125	0.166	0.123	0.125	0.136	0.137	0.132	0.123	0.134	
145.0	0.138	0.136	0.143	0.113	0.136	0.150	0.135	0.122	0.113	0.136	
161.4	0.545	0.532	0.532	0.559	0.471	0.526	0.523	0.513	0.471	0.529	
163.0	0.486	0.476	0.475	0.506	0.471	0.489	0.476	0.472	0.471	0.476	
178.0	0.175	0.176	0.166	0.173	0.168	0.189	0.168	0.191	0.166	0.174	
214.1	0.139	0.115	0.123	0.113	0.116	0.130	0.147	0.115	0.113	0.120	
280.0	L	L	L	L	L	L	L	L	L	0.100	
298.0	L	L	L	L	L	L	L	L	L	0.109	
311.8	L	L	L	L	L	L	L	L	L	0.105	

AN "L" INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION.
THE MEDIAN AND MINIMUM VALUES WERE CALCULATED USING THE PREFIRE THICKNESSES
AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING

Table E-VIII. RSRM-28A Forward Center Segment Insulation Performance

STATION (IN)	COMPLIANCE SAFETY FACTOR (CSF)										REQUIRED S.F.
	0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MIN.	PLANE	
3.5	12.85	23.56	15.70	12.47	13.77	13.77	16.43	12.25	12.25	316.0	2.0
11.0	17.92	17.59	10.92	15.32	17.76	8.44	5.19	9.60	5.19	270.0	1.5
30.7	5.61	5.30	6.50	5.49	5.86	5.23	6.24	6.24	5.23	226.0	1.5
36.2	7.23	6.38	7.89	6.82	15.00	6.59	6.38	7.14	6.38	270.0	1.5
44.6	15.00	24.00	18.00	22.50	+	10.29	8.37	15.65	8.37	270.0	1.5
71.5	7.73	14.17	11.33	7.39	8.95	6.54	9.44	10.00	6.54	226.0	1.5
126.0	21.43	30.00	21.43	10.71	21.43	7.89	10.71	13.64	7.89	226.0	1.5
145.0	21.43	75.00	+	21.43	+	13.64	11.54	30.00	11.54	270.0	1.5
161.4	3.15	7.15	6.94	5.13	15.73	6.38	6.21	6.94	3.15	0.0	2.0
163.0	3.42	4.82	4.21	5.49	5.24	3.58	5.49	+	3.42	0.0	2.0
178.0	21.67	+	26.00	+	+	10.00	+	+	10.00	226.0	1.5
214.1	+	26.00	+	+	+	13.00	+	+	13.00	226.0	1.5
280.0	+	+	+	+	+	+	+	+	+	0.0	1.5
298.0	+	+	+	+	+	+	+	+	+	0.0	1.5
311.8	+	+	+	+	+	+	+	+	+	0.0	1.5

SEGMENT MINIMUM = 3.15 AT THE 161.4 INCH STATION
A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED

STATION (IN)	ACTUAL SAFETY FACTOR (ASF)										REQUIRED S.F.
	0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MIN.	PLANE	
3.5	15.94	29.11	19.19	15.55	17.01	17.05	20.45	15.54	15.54	316.0	2.0
11.0	22.18	21.92	14.11	19.40	22.74	10.84	7.11	12.40	7.11	270.0	1.5
30.7	6.31	5.89	7.24	6.28	6.70	5.84	6.87	7.14	5.84	226.0	1.5
36.2	9.95	8.71	10.78	9.43	21.27	8.90	8.70	9.88	8.70	270.0	1.5
44.6	15.46	23.87	18.15	22.50	+	10.20	8.60	15.91	8.60	270.0	1.5
71.5	8.82	15.58	12.13	8.17	9.89	7.04	10.61	11.29	7.04	226.0	1.5
126.0	24.00	31.80	23.57	11.29	23.29	8.32	11.50	14.45	8.32	226.0	1.5
145.0	22.29	76.50	+	22.00	+	13.91	11.85	10.80	11.85	270.0	1.5
161.4	7.48	16.70	15.79	12.04	36.40	14.70	14.84	16.85	7.48	0.0	2.0
163.0	7.97	11.22	9.82	12.79	12.22	8.33	12.79	+	7.97	0.0	2.0
178.0	31.50	+	36.80	+	+	14.77	+	+	14.77	226.0	1.5
214.1	+	26.60	+	+	+	13.40	+	+	13.40	226.0	1.5
280.0	+	+	+	+	+	+	+	+	+	0.0	1.5
298.0	+	+	+	+	+	+	+	+	+	0.0	1.5
311.8	+	+	+	+	+	+	+	+	+	0.0	1.5

SEGMENT MINIMUM = 5.84 AT THE 30.7 INCH STATION
A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED

Table E-VIII. RSRM-28A Forward Center Segment Insulation Performance (Cont.)

STATION (IN)	MATERIAL DECOMPOSITION DEPTH (MDD) INCHES										DESIGN M+3S
	0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MEDIAN	MAX.	
3.5	0.165	0.090	0.135	0.170	0.154	0.154	0.129	0.173	0.154	0.173	1.067
11.0	0.106	0.108	0.174	0.124	0.107	0.225	0.366	0.198	0.149	0.366	0.829
30.7	0.138	0.146	0.119	0.141	0.132	0.148	0.124	0.124	0.135	0.148	0.484
36.2	0.083	0.094	0.076	0.088	0.040	0.091	0.094	0.084	0.086	0.094	0.318
44.6	0.024	0.015	0.020	0.016	0	0.035	0.043	0.023	0.022	0.043	0.090
71.5	0.022	0.012	0.015	0.023	0.019	0.026	0.018	0.017	0.019	0.026	0.086
126.0	0.007	0.005	0.007	0.014	0.007	0.019	0.014	0.011	0.009	0.019	0.074
145.0	0.007	0.002	0	0.007	0	0.011	0.013	0.005	0.006	0.013	0.063
161.4	0.075	0.033	0.034	0.046	0.015	0.037	0.038	0.034	0.036	0.075	0.082
163.0	0.069	0.049	0.056	0.043	0.045	0.066	0.043	0	0.047	0.069	0.082
178.0	0.006	0	0.005	0	0	0.013	0	0	0	0.013	0.065
214.1	0	0.005	0	0	0	0.010	0	0	0	0.010	0.029
280.0	0	0	0	0	0	0	0	0	0	0	0.005
298.0	0	0	0	0	0	0	0	0	0	0	0.005
311.8	0	0	0	0	0	0	0	0	0	0	0.003

**MATERIAL DECOMPOSITION RATE (MDR)
MILS / SECOND**

STATION (IN)	MATERIAL DECOMPOSITION RATE (MDR) MILS / SECOND										EXPOSURE TIME
	0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	AVE.	TIME	
3.5	1.5	0.8	1.2	1.5	1.4	1.4	1.2	1.5	1.3	112.1	1.3
11.0	1.1	1.1	1.8	1.3	1.1	2.3	3.7	2.0	1.8	97.7	1.8
30.7	2.9	3.0	2.5	2.9	2.8	3.1	2.6	2.6	2.8	48.0	2.8
36.2	2.5	2.8	2.3	2.7	1.2	2.7	2.8	2.5	2.4	33.2	2.4
44.6	1.9	1.2	1.6	1.3	0	2.7	3.4	1.8	1.7	12.8	1.7
71.5	2.0	1.1	1.4	2.1	1.7	2.4	1.6	1.5	1.7	11.0	1.7
126.0	0.7	0.5	0.7	1.5	0.7	2.0	1.5	1.1	1.1	9.6	1.1
145.0	0.9	0.3	0	0.9	0	1.4	1.6	0.6	0.7	8.0	0.7
161.4	6.9	3.1	3.1	4.3	1.4	3.4	3.5	3.1	3.6	10.8	3.6
163.0	6.4	4.5	5.2	4.0	4.2	6.1	4.0	0	4.3	10.8	4.3
178.0	0.8	0	0.7	0	0	1.8	0	0	0.4	7.2	0.4
214.1	0	0.7	0	0	0	1.4	0	0	0.3	7.2	0.3
280.0	0	0	0	0	0	0	0	0	0	4.2	0
298.0	0	0	0	0	0	0	0	0	0	4.0	0
311.8	0	0	0	0	0	0	0	0	0	3.4	0

MOTOR ACTION TIME = 123.3 SECONDS

Table E-VIII. RSRM-28A Forward Center Segment Insulation Performance (Cont.)

PART NO. 1U76667-02		PREFIRE MEASUREMENTS									
SERIAL NO. 0000060		INCHES									
STATION		DEGREE LOCATIONS									
(IN)		0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MIN.	MDT
3.5	2.630	2.620	2.590	2.643	2.620	2.620	2.626	2.638	2.688	2.590	2.628
11.0	2.351	2.367	2.455	2.406	2.433	2.439	2.439	2.602	2.456	2.351	2.436
30.7	0.871	0.860	0.861	0.886	0.884	0.865	0.865	0.852	0.885	0.852	0.868
36.2	0.826	0.819	0.819	0.830	0.851	0.810	0.818	0.818	0.830	0.810	0.822
44.6	0.371	0.358	0.363	0.360	0.377	0.357	0.370	0.366	0.366	0.357	0.365
71.5	0.194	0.187	0.182	0.188	0.188	0.183	0.191	0.192	0.192	0.182	0.188
126.0	0.168	0.159	0.165	0.158	0.163	0.158	0.161	0.159	0.159	0.158	0.160
145.0	0.156	0.153	0.155	0.154	0.153	0.153	0.154	0.154	0.154	0.153	0.154
161.4	0.561	0.551	0.537	0.554	0.546	0.546	0.544	0.564	0.573	0.537	0.553
163.0	0.550	0.550	0.550	0.550	0.550	0.550	0.550	0.550	0.550	0.550	0.550
178.0	0.189	0.192	0.184	0.191	0.188	0.192	0.187	0.178	0.178	0.178	0.189
214.1	0.119	0.133	0.132	0.119	0.133	0.134	0.132	0.121	0.121	0.119	0.132
280.0	0.124	0.108	0.099	0.102	0.107	0.096	0.112	0.099	0.099	0.096	0.105
298.0	0.099	0.107	0.100	0.106	0.112	0.109	0.095	0.109	0.109	0.095	0.106
311.8	0.091	0.101	0.102	0.111	0.111	0.102	0.094	0.099	0.099	0.091	0.102

PART NO. 1U76791-01		POSTFIRE MEASUREMENTS									
SERIAL NO. 0000027		INCHES									
STATION		DEGREE LOCATIONS									
(IN)		0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MIN.	MEDIAN
3.5	2.465	2.530	2.455	2.473	2.466	2.472	2.509	2.515	2.455	2.455	2.473
11.0	2.245	2.259	2.281	2.282	2.326	2.214	2.236	2.258	2.214	2.214	2.259
30.7	0.733	0.714	0.742	0.745	0.752	0.717	0.728	0.761	0.714	0.714	0.738
36.2	0.743	0.725	0.743	0.742	0.811	0.719	0.724	0.746	0.719	0.719	0.743
44.6	0.347	0.343	0.343	0.344	0.434	0.322	0.327	0.343	0.322	0.322	0.343
71.5	0.172	0.175	0.167	0.165	0.169	0.157	0.173	0.175	0.157	0.157	0.171
126.0	0.161	0.154	0.158	0.144	0.156	0.139	0.147	0.148	0.139	0.139	0.151
145.0	0.149	0.151	0.161	0.147	0.155	0.142	0.141	0.149	0.141	0.141	0.149
161.4	0.486	0.518	0.503	0.508	0.531	0.507	0.526	0.539	0.486	0.486	0.513
163.0	0.481	0.501	0.494	0.507	0.505	0.484	0.507	L	0.481	0.481	0.503
178.0	0.183	0.192	0.179	L	L	0.179	L	L	0.179	0.179	0.185
214.1	0.126	0.128	L	L	L	0.124	L	L	0.124	0.124	0.127
280.0	L	L	L	L	L	L	L	L	L	L	0.105
298.0	L	L	L	L	L	L	L	L	L	L	0.106
311.8	L	L	L	L	L	L	L	L	L	L	0.102

AN "L" INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION.
THE MEDIAN AND MINIMUM VALUES WERE CALCULATED USING THE PREFIRE THICKNESSES
AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING

Table E-IX. RSRM-28A Forward Segment Star Tip Insulation Performance

COMPLIANCE SAFETY FACTOR (CSF)							ACTUAL SAFETY FACTOR (ASF)									
STATION (IN)	DEGREE LOCATIONS					MIN.	PLANE	REQUIRED S.F.	STATION (IN)	DEGREE LOCATIONS					MIN.	PLANE
	90.0	154.0	222.0	286.0	352.0					90.0	154.0	222.0	286.0	352.0		
3.5	31.64	42.40	15.47	+	96.36	15.47	222.0	2.0	3.5	38.00	51.10	18.24	+	+	18.24	222.0
13.0	46.43	+	11.02	23.21	+	11.02	222.0	1.5	13.0	71.07	+	16.19	35.96	+	16.19	222.0
27.0	+	+	+	+	+	+	90.0	1.5	27.0	+	+	+	+	+	+	90.0
44.0	+	+	+	+	+	+	90.0	1.5	44.0	+	+	+	+	+	+	90.0
60.0	+	+	+	+	+	+	90.0	1.5	60.0	+	+	+	+	+	+	90.0
94.7	+	+	+	+	+	+	90.0	1.5	94.7	+	+	+	+	+	+	90.0
142.0	+	+	+	+	+	+	90.0	1.5	142.0	+	+	+	+	+	+	90.0
152.0	7.37	5.98	6.22	5.56	+	5.56	286.0	1.5	152.0	8.51	6.98	7.43	6.32	+	6.32	286.0
162.0	3.34	2.91	7.93	3.65	4.34	2.91	154.0	2.0	162.0	4.92	4.16	10.12	5.29	6.24	4.16	154.0
175.5	3.41	3.25	2.82	3.08	3.49	2.82	222.0	1.5	175.5	4.16	3.88	3.44	3.65	4.22	3.44	222.0
187.0	2.42	2.66	2.77	3.17	3.11	2.42	90.0	1.5	187.0	2.65	2.86	2.94	3.41	3.36	2.65	90.0
199.0	2.47	2.53	2.15	3.54	3.09	2.15	222.0	1.5	199.0	2.76	2.93	2.47	3.93	3.48	2.47	222.0
213.0	4.40	2.47	4.15	3.25	2.68	2.47	154.0	1.5	213.0	4.53	2.82	4.45	3.77	3.04	2.82	154.0
224.0	2.65	2.87	2.86	2.88	3.25	2.65	90.0	1.5	224.0	3.12	3.43	3.40	3.36	3.74	3.12	90.0
230.0	2.55	2.55	2.73	2.59	3.44	2.55	90.0	1.5	230.0	2.89	3.11	3.18	2.99	3.84	2.89	90.0
236.0	2.09	2.82	2.21	3.12	2.74	2.09	90.0	1.5	236.0	2.48	2.99	2.72	3.65	3.18	2.48	90.0
240.0	2.18	2.04	2.20	2.09	2.77	2.04	154.0	1.5	240.0	2.60	2.41	2.68	2.45	3.18	2.41	154.0
254.0	2.19	2.45	2.22	2.50	3.76	2.19	90.0	1.5	254.0	2.44	2.51	2.66	2.76	4.01	2.44	90.0
263.0	2.35	2.69	2.42	2.43	2.35	2.35	90.0	1.5	263.0	2.56	2.76	2.56	2.57	2.48	2.48	352.0
282.0	2.42	2.77	2.32	1.74	2.91	1.74	286.0	1.5	282.0	2.79	3.18	2.83	2.29	3.36	2.29	286.0
293.0	2.48	2.47	2.90	2.97	3.07	2.47	154.0	1.5	293.0	2.97	2.96	3.43	3.45	3.53	2.96	154.0
305.0	3.70	2.63	5.20	4.20	2.13	2.13	352.0	1.5	305.0	4.00	3.38	5.73	4.66	2.87	2.87	352.0
312.0	6.52	3.66	2.79	2.24	2.85	2.24	286.0	1.5	312.0	7.08	4.11	3.59	2.93	3.52	2.93	286.0
321.0	3.72	2.53	3.49	3.43	3.14	2.53	154.0	2.0	321.0	4.19	3.06	3.92	4.03	3.69	3.06	154.0
339.0	3.20	1.93	2.04	2.00	2.48	1.93	154.0	1.5	339.0	3.40	2.37	2.48	2.38	2.73	2.37	154.0
350.0	2.81	2.63	2.49	2.67	2.94	2.49	222.0	1.5	350.0	3.19	2.98	2.96	3.21	3.41	2.96	222.0
362.0	2.05	5.84	6.05	3.10	3.71	2.05	90.0	1.5	362.0	2.58	5.78	6.12	3.67	4.21	2.58	90.0
371.0	2.81	2.57	2.11	2.95	3.33	2.11	222.0	1.5	371.0	3.44	3.19	2.66	3.70	3.96	2.66	222.0
383.0	6.08	5.49	2.37	2.94	3.34	2.37	222.0	1.5	383.0	6.13	5.53	2.97	3.52	3.93	2.97	222.0
397.0	2.68	2.55	2.41	2.36	3.03	2.36	286.0	1.5	397.0	3.18	3.14	3.10	2.96	3.84	2.96	286.0
403.0	3.38	3.86	4.38	3.67	4.40	3.38	90.0	1.5	403.0	3.81	4.27	4.92	4.21	5.09	3.81	90.0

SEGMENT MINIMUM = 1.74 AT THE 282.0 INCH STATION

SEGMENT MINIMUM = 2.29 AT THE 282.0 INCH STATION

SEGMENT MINIMUM = 1.74 AT THE 282.0 INCH STATION

SEGMENT MINIMUM = 2.29 AT THE 282.0 INCH STATION

A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED

Table E-IX. RSRM-28A Forward Segment Star Tip Insulation Performance (Cont.)

MATERIAL DECOMPOSITION DEPTH (MDD) INCHES				MATERIAL DECOMPOSITION RATE (MDR) MILS / SECOND				STATION (IN)	DESIGN M+3S	DEGREE LOCATIONS				EXPOSURE TIME
90.0	154.0	222.0	286.0	352.0	90.0	154.0	222.0			154.0	222.0	286.0	352.0	
3.5	0.067	0.050	0.137	0.007	0.022	0.050	0.137	0.103	0.103	1.9	1.5	4.0	0.2	1.6
13.0	0.014	0	0.059	0.028	0	0.014	0.059	0.101	0.101	0.7	0	3.0	1.4	0
27.0	0	0	0	0	0	0	0	0.044	0.044	0	0	0	0	0
44.0	0	0	0	0	0	0	0	0.015	0.015	0	0	0	0	0
60.0	0	0	0	0	0	0	0	0.012	0.012	0	0	0	0	0
94.7	0	0	0	0	0	0	0	0.004	0.004	0	0	0	0	0
142.0	0	0	0	0	0	0	0	0.019	0.019	0	0	0	0	0
152.0	0.043	0.053	0.051	0.057	0	0.051	0.057	0.123	0.123	1.3	1.6	1.6	1.7	0
162.0	0.164	0.188	0.069	0.150	0.126	0.150	0.188	0.227	0.227	2.8	3.2	1.2	2.6	2.2
175.5	0.177	0.186	0.214	0.196	0.173	0.186	0.214	0.324	0.324	2.0	2.1	2.4	2.2	1.9
187.0	0.264	0.241	0.231	0.202	0.206	0.231	0.264	0.398	0.398	2.6	2.4	2.3	2.0	2.0
199.0	0.276	0.270	0.318	0.193	0.221	0.270	0.318	0.427	0.427	1.9	2.6	3.1	1.9	2.2
213.0	0.154	0.274	0.163	0.208	0.253	0.208	0.274	0.423	0.423	1.5	2.7	1.6	2.0	2.5
224.0	0.255	0.236	0.237	0.235	0.208	0.236	0.255	0.422	0.422	2.5	2.3	2.3	2.0	2.3
230.0	0.266	0.265	0.248	0.261	0.197	0.261	0.266	0.375	0.375	2.6	2.6	2.4	2.6	1.9
236.0	0.277	0.205	0.261	0.185	0.211	0.211	0.277	0.327	0.327	2.7	2.0	2.6	1.8	2.1
240.0	0.263	0.282	0.261	0.275	0.207	0.263	0.282	0.342	0.342	2.6	2.8	2.6	2.7	2.0
254.0	0.259	0.232	0.256	0.227	0.151	0.232	0.259	0.318	0.318	2.5	2.3	2.5	2.2	1.5
263.0	0.242	0.211	0.235	0.234	0.242	0.235	0.242	0.334	0.334	2.4	2.1	2.3	2.3	2.4
282.0	0.235	0.205	0.245	0.326	0.195	0.235	0.326	0.349	0.349	2.3	2.0	2.4	3.2	1.9
293.0	0.220	0.221	0.188	0.184	0.178	0.188	0.221	0.330	0.330	2.2	2.2	1.8	1.8	1.7
305.0	0.142	0.200	0.101	0.125	0.246	0.142	0.246	0.309	0.309	1.4	2.0	1.0	1.2	2.4
312.0	0.083	0.148	0.194	0.242	0.190	0.190	0.242	0.308	0.308	0.8	1.4	1.9	2.4	1.9
321.0	0.247	0.363	0.263	0.268	0.292	0.268	0.363	0.434	0.434	2.4	3.5	2.5	2.6	2.8
339.0	0.172	0.286	0.270	0.276	0.222	0.270	0.286	0.319	0.319	1.7	2.8	2.7	2.7	2.2
350.0	0.186	0.199	0.210	0.196	0.178	0.196	0.210	0.300	0.300	1.9	2.0	2.1	2.0	1.8
362.0	0.254	0.089	0.086	0.168	0.140	0.140	0.254	0.285	0.285	2.6	0.9	0.9	1.7	1.4
371.0	0.185	0.202	0.246	0.176	0.156	0.185	0.246	0.304	0.304	1.9	2.1	2.6	1.9	1.6
383.0	0.084	0.093	0.216	0.174	0.153	0.153	0.216	0.295	0.295	0.9	1.0	2.2	1.8	1.6
397.0	0.188	0.197	0.209	0.213	0.166	0.197	0.213	0.287	0.287	1.9	2.0	2.1	1.7	1.9
403.0	0.281	0.246	0.217	0.259	0.216	0.246	0.281	0.287	0.287	2.3	2.0	1.8	2.1	2.0

MOTOR ACTION TIME = 123.3 SECONDS

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA

Table E-IX. RSRM-28A Forward Segment Star Tip Insulation Performance (Cont.)

PREFIRE MEASUREMENTS INCHES					POSTFIRE MEASUREMENTS INCHES				
PART NO. 1U76666-02 SERIAL NO. 0000031					PART NO. 1U76790-05 SERIAL NO. 0000013				
STATION (IN)	DEGREE LOCATIONS				STATION (IN)	DEGREE LOCATIONS			
	90.0	154.0	222.0	352.0		90.0	154.0	222.0	352.0
3.5	2.546	2.555	2.499	2.597	2.608	2.479	2.505	2.362	2.586
13.0	0.995	0.885	0.955	1.007	0.998	0.981	0.908	0.896	0.979
27.0	0.832	0.604	0.588	0.618	0.624	L	L	L	L
44.0	0.304	0.296	0.297	0.295	0.294	L	L	L	L
60.0	0.146	0.143	0.143	0.144	0.149	L	L	L	L
94.7	0.093	0.108	0.095	0.094	0.100	L	L	L	L
142.0	0.152	0.155	0.158	0.154	0.160	L	L	L	L
152.0	0.366	0.370	0.379	0.360	0.394	0.323	0.317	0.328	0.303
162.0	0.807	0.782	0.698	0.793	0.786	0.643	0.594	0.629	0.660
175.5	0.736	0.722	0.736	0.716	0.730	0.559	0.536	0.522	0.520
187.0	0.699	0.689	0.679	0.688	0.692	0.435	0.448	0.448	0.486
199.0	0.761	0.790	0.787	0.758	0.769	0.485	0.520	0.469	0.565
213.0	0.697	0.772	0.725	0.785	0.770	0.543	0.498	0.562	0.577
224.0	0.795	0.809	0.806	0.789	0.777	0.540	0.573	0.569	0.554
236.0	0.769	0.834	0.788	0.780	0.756	0.503	0.559	0.540	0.519
240.0	0.685	0.679	0.700	0.675	0.658	0.411	0.407	0.450	0.491
254.0	0.633	0.583	0.682	0.627	0.606	0.422	0.397	0.439	0.400
263.0	0.619	0.582	0.602	0.601	0.601	0.374	0.351	0.426	0.400
282.0	0.656	0.651	0.694	0.745	0.655	0.377	0.371	0.367	0.359
293.0	0.653	0.655	0.644	0.634	0.628	0.421	0.446	0.449	0.419
305.0	0.568	0.676	0.579	0.582	0.705	0.433	0.434	0.456	0.450
312.0	0.588	0.609	0.697	0.710	0.669	0.426	0.476	0.478	0.457
321.0	1.034	1.111	1.032	1.081	1.077	0.505	0.461	0.503	0.468
339.0	0.585	0.678	0.670	0.658	0.605	0.787	0.748	0.769	0.813
350.0	0.593	0.593	0.621	0.630	0.607	0.413	0.392	0.400	0.382
362.0	0.655	0.514	0.526	0.616	0.589	0.407	0.394	0.411	0.434
371.0	0.637	0.644	0.654	0.651	0.617	0.401	0.425	0.440	0.448
383.0	0.515	0.514	0.641	0.613	0.602	0.452	0.442	0.408	0.475
397.0	0.597	0.619	0.648	0.630	0.637	0.431	0.421	0.425	0.439
403.0	1.072	1.050	1.068	1.090	1.099	0.409	0.422	0.439	0.417
						0.791	0.804	0.851	0.831
									0.791
									0.831

AN "L" INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION.
THE MEDIAN AND MINIMUM VALUES WERE CALCULATED USING THE PREFIRE THICKNESSES
AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING

Table E-X. RSRM-28A Forward Segment Non-Star Tip Insulation Performance

COMPLIANCE SAFETY FACTOR (CSF)				ACTUAL SAFETY FACTOR (ASF)			
STATION (IN)	DEGREE LOCATIONS			STATION (IN)	DEGREE LOCATIONS		
	74.0	140.0	270.0	74.0	140.0	270.0	336.0
MIN.				MIN.			
3.5	64.24	47.11	33.65	34.19	33.65	206.0	206.0
13.0	12.04	16.67	27.08	6.19	22.41	270.0	270.0
27.0	+	+	+	+	+	74.0	74.0
44.0	+	+	+	+	+	74.0	74.0
60.0	+	+	+	+	+	74.0	74.0
94.7	+	+	+	+	+	74.0	74.0
142.0	+	+	+	+	+	74.0	74.0
152.0	11.32	+	6.10	+	+	74.0	74.0
162.0	4.93	4.88	3.06	5.21	3.02	206.0	206.0
175.5	4.17	3.30	3.82	3.95	4.87	336.0	4.69
187.0	4.81	3.70	3.35	3.50	4.81	140.0	4.89
199.0	3.54	3.56	3.48	3.59	5.69	206.0	5.11
213.0	3.91	7.36	4.54	3.85	5.29	206.0	3.92
224.0	4.03	5.01	3.87	4.34	3.87	270.0	4.67
230.0	4.01	3.76	3.68	4.48	5.60	206.0	4.59
236.0	3.48	3.85	3.75	3.03	3.68	206.0	4.30
240.0	3.73	3.59	3.83	3.07	4.07	270.0	3.94
254.0	3.23	3.89	2.85	2.97	4.21	206.0	3.85
263.0	3.79	3.16	3.17	4.34	4.98	140.0	3.42
282.0	3.05	3.84	4.40	3.01	4.34	270.0	3.59
293.0	3.37	3.23	4.67	2.65	3.59	206.0	3.62
305.0	3.98	2.85	2.60	3.78	4.01	206.0	3.32
312.0	3.56	9.49	3.24	6.36	3.32	206.0	5.08
321.0	5.96	5.02	7.65	3.92	5.37	270.0	4.95
339.0	4.14	3.53	2.53	3.85	3.15	206.0	4.25
350.0	3.44	3.63	2.39	2.60	3.90	206.0	3.74
362.0	3.49	6.19	2.64	2.54	3.01	270.0	3.08
371.0	3.38	9.12	2.77	1.10	7.54	270.0	3.61
383.0	2.59	5.68	2.89	3.25	2.59	74.0	2.00
397.0	1.82	2.61	2.44	2.20	3.29	74.0	3.92
403.0	3.71	3.35	4.61	3.33	4.34	270.0	2.52

SEGMENT MINIMUM = 1.10 AT THE 371.0 INCH STATION
 A " < " INDICATES THE PRECEDING SAFETY FACTOR HAS VIOLATED THE MINIMUM SAFETY FACTOR REQUIREMENT
 A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED

Table E-X. RSRM-28A Forward Segment Non-Star Tip Insulation Performance (Cont.)

MATERIAL DECOMPOSITION RATE (MDR)														
STATION					DEGREE LOCATIONS					MATERIAL DECOMPOSITION RATE (MDR)				
(IN)					74.0 140.0 206.0 270.0 336.0					MILS / SECOND				
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					74.0 140.0 206.0 270.0 336.0					AVE.				
					74.0 140.0 206.0 270.0 336.0					AVE.				
					74.0 140.0 206.0 270.0 336.0					AVE.				
					74.0 140.0 206.0 270.0 336.0					AVE.				
					74.0 140.0 206.0 270.0 336.0					AVE.				
					74.0 140.0 206.0 270.0 336.0					AVE.				
					74.0 140.0 206.0 270.0 336.0					AVE.				
					74.0 140.0 206.0 270.0 336.0					AVE.				
					74.0 140.0 206.0 270.0 336.0					AVE.				

MOTOR ACTION TIME = 123.3 SECONDS

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA

Table E-X. RSRM-28A Forward Segment Non-Star Tip Insulation Performance (Cont.)

PREFIRE MEASUREMENTS				POSTFIRE MEASUREMENTS				PART NO. 1U76666-02				PART NO. 1U76790-05			
INCHES				INCHES				SERIAL NO. 0000031				SERIAL NO. 0000013			
STATION (IN)				STATION (IN)				STATION (IN)				STATION (IN)			
74.0 140.0 206.0 270.0 336.0				74.0 140.0 206.0 270.0 336.0				74.0 140.0 206.0 270.0 336.0				74.0 140.0 206.0 270.0 336.0			
MIN. MEDIAN MDT				MIN. MEDIAN MDT				MIN. MEDIAN MDT				MIN. MEDIAN			
3.5	2.603	2.633	2.576	2.655	2.619	2.120	2.576	2.619	2.120	3.5	2.570	2.588	2.513	2.593	2.557
13.0	0.936	0.928	0.964	1.058	0.978	0.928	0.928	0.964	0.950	13.0	0.882	0.889	0.940	0.953	0.949
27.0	0.504	0.620	0.591	0.612	0.597	0.591	0.591	0.604	0.450	27.0	L	L	L	L	L
44.0	0.303	0.296	0.293	0.301	0.295	0.293	0.293	0.296	0.250	44.0	L	L	L	L	L
60.0	0.145	0.138	0.138	0.153	0.145	0.138	0.138	0.145	0.100	60.0	L	L	L	L	L
94.7	0.090	0.094	0.095	0.112	0.110	0.090	0.090	0.095	0.090	94.7	L	L	L	L	L
142.0	0.152	0.151	0.156	0.160	0.158	0.151	0.151	0.156	0.113	142.0	L	L	L	L	L
152.0	0.411	0.383	0.407	0.379	0.393	0.379	0.379	0.393	0.317	152.0	0.383	L	0.355	0.378	L
162.0	0.787	0.784	0.801	0.776	0.848	0.776	0.776	0.787	0.547	162.0	0.676	0.672	0.622	0.671	0.667
175.5	0.752	0.757	0.796	0.748	0.766	0.748	0.748	0.757	0.604	175.5	0.607	0.574	0.638	0.595	0.642
187.0	0.675	0.674	0.700	0.704	0.679	0.674	0.674	0.679	0.640	187.0	0.542	0.501	0.509	0.521	0.546
199.0	0.777	0.767	0.768	0.796	0.774	0.767	0.767	0.774	0.683	199.0	0.584	0.575	0.572	0.606	0.654
213.0	0.794	0.696	0.708	0.822	0.785	0.696	0.696	0.785	0.677	213.0	0.621	0.604	0.559	0.646	0.657
224.0	0.838	0.778	0.804	0.827	0.846	0.778	0.778	0.827	0.677	224.0	0.670	0.643	0.629	0.656	0.690
230.0	0.797	0.787	0.791	0.771	0.764	0.764	0.764	0.787	0.677	230.0	0.628	0.607	0.607	0.620	0.643
236.0	0.691	0.671	0.672	0.752	0.689	0.671	0.671	0.689	0.578	236.0	0.525	0.521	0.518	0.561	0.532
240.0	0.675	0.681	0.680	0.720	0.660	0.660	0.660	0.680	0.574	240.0	0.521	0.521	0.530	0.533	0.519
254.0	0.642	0.639	0.680	0.671	0.623	0.623	0.623	0.642	0.568	254.0	0.466	0.493	0.481	0.480	0.488
263.0	0.617	0.646	0.644	0.606	0.590	0.590	0.590	0.617	0.568	263.0	0.467	0.466	0.465	0.475	0.476
282.0	0.674	0.662	0.659	0.713	0.665	0.659	0.659	0.665	0.568	282.0	0.488	0.514	0.530	0.524	0.534
293.0	0.647	0.660	0.630	0.684	0.639	0.630	0.630	0.647	0.546	293.0	0.485	0.491	0.513	0.478	0.487
305.0	0.664	0.721	0.714	0.688	0.676	0.664	0.664	0.688	0.525	305.0	0.532	0.537	0.512	0.549	0.545
312.0	0.696	0.611	0.690	0.637	0.683	0.611	0.611	0.683	0.541	312.0	0.544	0.554	0.523	0.552	0.520
321.0	1.059	1.055	1.038	1.080	1.085	1.038	1.038	1.059	0.918	321.0	0.905	0.872	0.918	0.846	0.914
339.0	0.583	0.629	0.614	0.608	0.655	0.563	0.563	0.614	0.551	339.0	0.430	0.473	0.396	0.465	0.480
350.0	0.584	0.589	0.630	0.619	0.616	0.584	0.584	0.616	0.523	350.0	0.432	0.445	0.411	0.418	0.482
362.0	0.577	0.506	0.631	0.665	0.624	0.506	0.506	0.624	0.520	362.0	0.428	0.422	0.434	0.460	0.451
371.0	0.606	0.521	0.625	0.941	0.618	0.521	0.521	0.618	0.520	371.0	0.452	0.464	0.437	0.470	0.549
383.0	0.631	0.507	0.609	0.600	0.615	0.507	0.507	0.609	0.511	383.0	0.434	0.417	0.432	0.426	0.458
397.0	0.696	0.617	0.640	0.673	0.601	0.601	0.601	0.640	0.503	397.0	0.420	0.424	0.434	0.444	0.448
403.0	1.070	1.106	1.063	1.108	1.088	1.063	1.063	1.088	0.950	403.0	0.814	0.822	0.857	0.823	0.869

AN "L" INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION.
THE MEDIAN AND MINIMUM VALUES WERE CALCULATED USING THE PREFIRE THICKNESSES
AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING

Table E-XI. RSRM-28A Igniter Chamber and Adapter Insulation Performance

STATION (NO.)	COMPLIANCE SAFETY FACTORS (CSF)									
	DEGREE LOCATION					MINIMUM PLANE				
1.0	0.0	60.0	90.0	150.0	180.0	240.0	270.0	330.0	330.0	180.0
2.0										
3.0										
4.0										
5.0										
6.0										
7.0										
8.0										
9.0										
10.0										
11.0	2.57	2.63	2.61	2.71	2.40	2.63	2.54	2.63	2.40	180.0

SF= + INDICATES THAT NEGLIGIBLE MDD OCCURRED

A BLANK INDICATES NO DATA AVAILABLE FOR THAT STATION

STATION (NO.)	ACTUAL SAFETY FACTORS (ASF)									
	DEGREE LOCATION					MINIMUM PLANE				
1.0	0.0	60.0	90.0	150.0	180.0	240.0	270.0	330.0	330.0	180.0
2.0										
3.0										
4.0										
5.0										
6.0										
7.0										
8.0										
9.0										
10.0										
11.0	3.07	3.14	3.12	3.23	2.87	3.14	3.03	3.14	2.87	180.0

SF= + INDICATES THAT NEGLIGIBLE MDD OCCURRED

A BLANK INDICATES NO DATA AVAILABLE FOR THAT STATION

Table E-XI. RSRM-28A Igniter Chamber and Adapter Insulation Performance (Cont.)

STATION (NO.)	MATERIAL DECOMPOSITION DEPTH (MDD) (INCHES)				DEGREE LOCATION				MEDIAN	MAXIMUM
	0.0	60.0	90.0	150.0	180.0	240.0	270.0	330.0		
1.0										
2.0										
3.0										
4.0										
5.0										
6.0										
7.0										
8.0										
9.0										
10.0										
11.0	0.176	0.172	0.173	0.167	0.188	0.172	0.178	0.172	0.173	0.188

A BLANK INDICATES NO DATA AVAILABLE FOR THAT STATION

STATION (NO.)	MATERIAL DECOMPOSITION RATE (MDR) (MILS/SEC)							
	DEGREE LOCATION				AVERAGE			
	0.0	60.0	90.0	150.0	180.0	240.0	270.0	330.0
1.0								
2.0								
3.0								
4.0								
5.0								
6.0								
7.0								
8.0								
9.0								
10.0								
11.0	1.4	1.4	1.4	1.4	1.5	1.4	1.4	1.4

MOTOR ACTION (EXPOSURE) TIME = 123.30 SEC

A MDR=0 INDICATES THAT MDR = .1 MIL/SEC

A BLANK INDICATES NO DATA AVAILABLE FOR THAT STATION

Table E-XI. RSRM-28A Igniter Chamber and Adapter Insulation Performance (Cont.)

CHAMBER PART NO. 1U77392-01(902)
CHAMBER SERIAL NO. 0000013
ADAPTER PART NO. 1U75163-03(903) PREFIRE MEASUREMENTS
ADAPTER SERIAL NO. 0000003 INCHES

STATION (NO.)	0.0	60.0	90.0	150.0	180.0	240.0	270.0	330.0	MEDIAN	MINIMUM
1.0										
2.0										
3.0										
4.0										
5.0										
6.0										
7.0										
8.0										
9.0										
10.0										
11.0	0.540	0.540	0.540	0.540	0.540	0.540	0.540	0.540	0.540	0.540

A BLANK INDICATES NO DATA WAS TAKEN AT THAT STATION

CHAMBER PART NO. 1U77457-01(903)
CHAMBER SERIAL NO. 0000009
ADAPTER PART NO. 1U75161-02(902) POSTFIRE MEASUREMENTS
ADAPTER SERIAL NO. 0000001 INCHES

STATION (NO.)	0.0	60.0	90.0	150.0	180.0	240.0	270.0	330.0	MEDIAN	MINIMUM
1.0										
2.0										
3.0										
4.0										
5.0										
6.0										
7.0										
8.0										
9.0										
10.0										
11.0	0.364	0.368	0.367	0.373	0.352	0.368	0.362	0.368	0.368	0.352

A BLANK INDICATES NO DATA WAS TAKEN AT THAT STATION

Table E-XII. RSRM-28B Igniter Chamber and Adapter Insulation Performance

REVISION _____

COMPLIANCE SAFETY FACTORS (CSF)									
STATION (NO.)	0.0	60.0	90.0	150.0	180.0	240.0	270.0	330.0	MINIMUM PLANE
1.0									
2.0									
3.0									
4.0									
5.0									
6.0									
7.0									
8.0									
9.0									
10.0									
11.0	2.72	2.77	2.92	2.63	2.71	2.76	2.76	2.57	2.57 330.0

SF= + INDICATES THAT NEGLIGIBLE MDD OCCURRED

A BLANK INDICATES NO DATA AVAILABLE FOR THAT STATION

ACTUAL SAFETY FACTORS (ASF)									
STATION (NO.)	0.0	60.0	90.0	150.0	180.0	240.0	270.0	330.0	MINIMUM PLANE
1.0									
2.0									
3.0									
4.0									
5.0									
6.0									
7.0									
8.0									
9.0									
10.0									
11.0	3.25	3.31	3.48	3.14	3.23	3.29	3.29	3.07	3.07 330.0

SF= + INDICATES THAT NEGLIGIBLE MDD OCCURRED

A BLANK INDICATES NO DATA AVAILABLE FOR THAT STATION

Table E-XII. RSRM-28B Igniter Chamber and Adapter Insulation Performance (Cont.)

STATION (NO.)	MATERIAL DECOMPOSITION DEPTH (MDD) (INCHES)			DEGREE LOCATION			MATERIAL DECOMPOSITION RATE (MDR) (MILS/SEC)		
	0.0	60.0	90.0	150.0	180.0	240.0	270.0	330.0	360.0
1.0									
2.0									
3.0									
4.0									
5.0									
6.0									
7.0									
8.0									
9.0									
10.0									
11.0	0.166	0.163	0.155	0.172	0.167	0.164	0.164	0.176	0.176

A BLANK INDICATES NO DATA AVAILABLE FOR THAT STATION

STATION (NO.)	MATERIAL DECOMPOSITION DEPTH (MDD) (INCHES)			DEGREE LOCATION			MATERIAL DECOMPOSITION RATE (MDR) (MILS/SEC)		
	0.0	60.0	90.0	150.0	180.0	240.0	270.0	330.0	360.0
1.0									
2.0									
3.0									
4.0									
5.0									
6.0									
7.0									
8.0									
9.0									
10.0									
11.0	1.3	1.3	1.3	1.4	1.4	1.3	1.3	1.4	1.3

MOTOR ACTION (EXPOSURE) TIME = 123.60 SEC

A MDR=0 INDICATES THAT MDR IS 0 MIL/SEC

A BLANK INDICATES NO DATA AVAILABLE FOR THAT STATION

Table E-XII. RSRM-28B Igniter Chamber and Adapter Insulation Performance (Cont.)

CHAMBER PART NO. 1U77392-01(902)
CHAMBER SERIAL NO. 0000012
ADAPTER PART NO. 1U76163-03(903)
ADAPTER SERIAL NO. 0000004

PREFIRE MEASUREMENTS
INCHES

STATION (NO.)	0.0	60.0	90.0	150.0	180.0	240.0	270.0	330.0	MEDIAN	MINIMUM
1.0										
2.0										
3.0										
4.0										
5.0										
6.0										
7.0										
8.0										
9.0										
10.0										
11.0	0.540	0.540	0.540	0.540	0.540	0.540	0.540	0.540	0.540	0.540

A BLANK INDICATES NO DATA WAS TAKEN AT THAT STATION

CHAMBER PART NO. 1U77457-01(903)
CHAMBER SERIAL NO. 0000010
ADAPTER PART NO. 1U75161-02(902)
ADAPTER SERIAL NO. 0000002

POSTFIRE MEASUREMENTS
INCHES

STATION (NO.)	0.0	60.0	90.0	150.0	180.0	240.0	270.0	330.0	MEDIAN	MINIMUM
1.0										
2.0										
3.0										
4.0										
5.0										
6.0										
7.0										
8.0										
9.0										
10.0										
11.0	0.374	0.377	0.385	0.368	0.373	0.376	0.376	0.364	0.375	0.364

A BLANK INDICATES NO DATA WAS TAKEN AT THAT STATION

ORIGINAL PAGE IS
OF POOR QUALITY

